R.G. EVANS
M.F. WILLIAMSON

Extending Canadian Health Insurance: options for pharmacare and denticare

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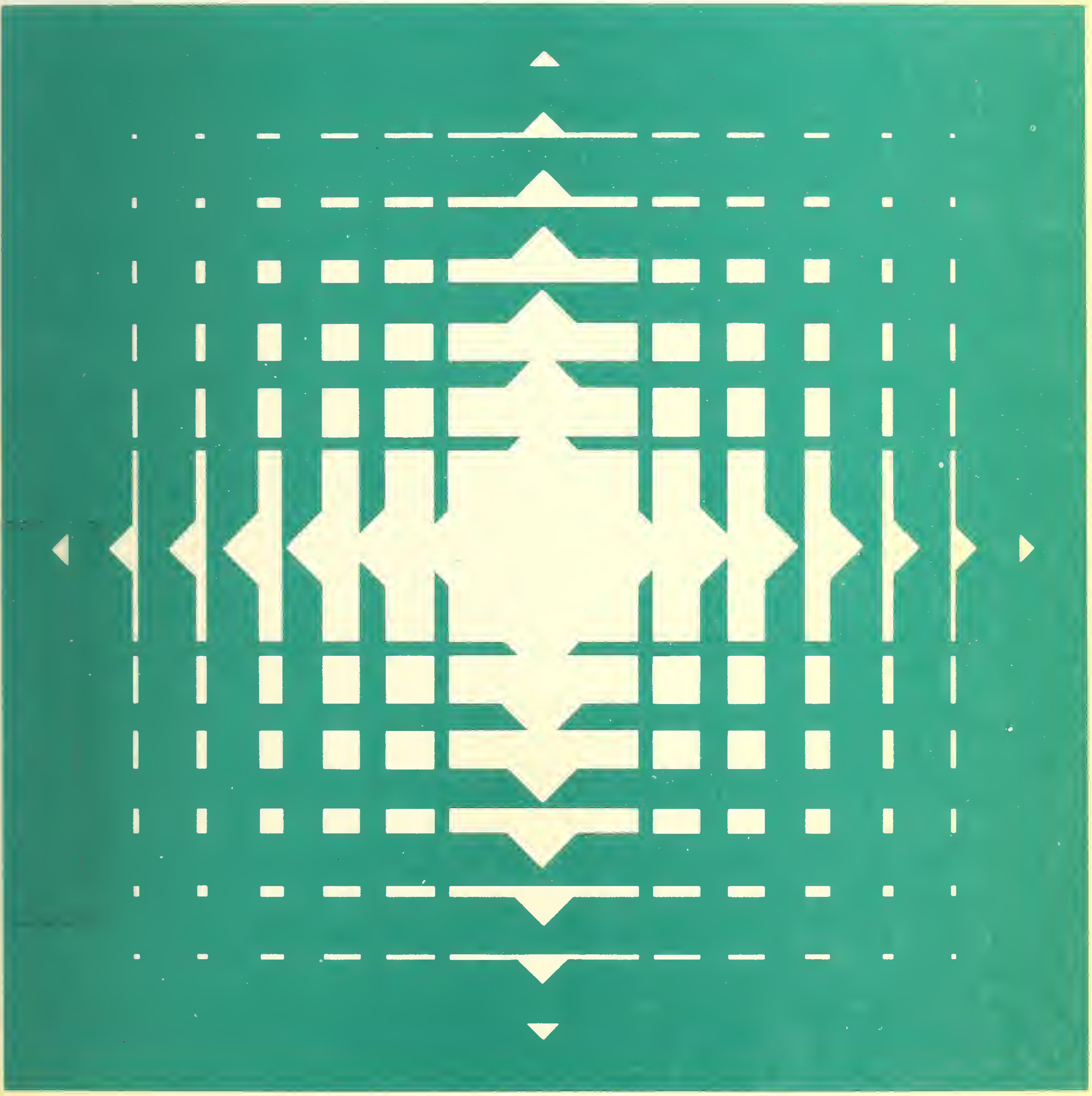

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EXTENDING CANADIAN HEALTH INSURANCE: OPTIONS FOR PHARMACARE AND DENTICARE

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R. G. Evans and M. F. Williamson

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Preface

In the past twenty years, the costs of reimbursing hospital and medical care in Canada have been almost entirely shifted from private to public budgets. The federal and provincial governments between them have put in place programs which are described as 'insurance,' implying that their primary function is intended as the payment of legitimate claims by providers rather than the exertion of direct influence on the process of health care delivery. The Hall Commission in 1964 said of its medicare proposals: 'they do not involve any control over the physician or dentist in the practice of his calling.' Canada has a national health insurance system, not a national health service.

It is in this context which we have interpreted the terms 'pharmacare' and 'denticare' to designate public programs extending the medicare model to cover dental and pharmaceutical services. In such programs independent providers would continue to practise as they do at present, with their services being reimbursed at uniform rates collectively negotiated between the professions involved and the provincial reimbursing agencies. In this study we have attempted to provide estimates of what the total costs of such universal pharmacare and denticare programs might have been in Ontario in 1975. These estimates, developed in chapters two and four, are based on 1975 population, utilization, and price data either actual or projected from previous years. The data are not all complete or up to date, but the estimates are intended to indicate the approximate orders of magnitude of such program costs and to provide a framework within which an interested reader might insert preferred data and generate better estimates. The specific numbers might change, the general conclusions should not.

Such program cost estimates do not, of course, represent the costs to the province as a whole of extending public health insurance. Almost all the increases in government expenditures are matched by corresponding reductions in private expenditures; a province-wide cost-benefit analysis of a pharmacare or denticare program would cancel these out against each other. In evaluating such programs therefore, we have stepped back to try to develop a more general specification of what the objectives of the public sector might or should be in initiating health insurance programs. In particular we suggest that appropriate public objectives would include: reduction of the financial risks to which people are exposed as a result of unpredictable illness, redistribution of the financial burdens of illness (predictable or unpredictable) to be more proportionate to ability to pay and less proportionate to illness incidence, changing the levels and types of health care which people use (increasing or decreasing) in order to improve health status, and maintaining or improving the economic efficiency with which the health care delivery system provides its products and services.

In chapters two and four we assemble data from a wide variety of sources, not all as reliable or as relevant as we would like, to attempt to evaluate universal pharmacare and denticare against these objectives. We also note that universality is not a goal in itself, but only insofar as it serves broader public objectives; and we therefore attempt also to cost out and evaluate more limited alternatives by which reimbursement would be provided only for a part of the population and/or a part of each beneficiary's bills. These partial programs are evaluated not as an interim step on the road to universality, but as long-run alternatives.

The historical experience with hospital and medical insurance in Canada has demonstrated rather conclusively that a public program focused only on the demand side of the care delivery process, paying provider claims, cannot avoid at the same time inducing significant changes in the behaviour of providers of care. These in turn call forth responses by the public sector, often in an *ad hoc* manner, to influence the process of delivery itself. As a result the Hall Commission statement referred to above has been inaccurate, and in retrospect this seems to have been inevitable. Thus we may anticipate that major public initiatives in the reimbursement of pharmaceutical and dental services will certainly have a significant impact of some sort on the supply side.

In chapters three and five, we attempt to broaden the range of perceived alternatives for the organization of service delivery, and to evaluate some of these alternatives against the list of public objectives developed in chapter one. The intention here is to show that extension of the medicare model is only one set or pattern of policy options from a broad spectrum which includes possibilities for increased 'socialization' of some health care services, all the way over to direct public provision, as well as significantly increased use of competitive market forces to organize the resource allocation process.

It appears to us that there is no single 'right' choice from this spectrum for all of health care, because 'health care services' is an aggregative term which can be as misleading as it is convenient. The appropriate form of public intervention (if any) in the delivery of a particular type of health service should be determined by reference to the special characteristics of that type of service, and related to the more general public objectives as developed in chapter one. Our analysis suggests that the preferred mode of public intervention in pharmacy may be very different from that in dentistry, and both in turn from medicine, for reasons which can be clearly based on the different needs, utilization patterns, and delivery processes of the different services.

In this analysis we have drawn on a considerable body of empirical analysis and casual observation about the characteristic modes of internal operation of health care practices, particularly with respect to the delegation of duties to the various types of auxiliary workers which have been developed. These observations are not always consistent with the predictions of conventional economic theory, and in chapter six we have attempted to outline certain modifications to this conventional analysis which lead to predictions of the behaviour we and many others have observed.

Acknowledgments

This project has its roots in a small background paper we wrote for the BC Health Security Programme Project (Foulkes Report) in 1973. This then became one strand feeding into the much larger BC Children's Dental Health Research Project, and we are greatly indebted to the members of the co-ordinating committee, staff, and advisors to that project for numerous discussions expanding our knowledge of and focusing our thinking on the dental care insurance and delivery process. We have used much of the data and other materials from that study in this monograph. More recent data on children's dentistry have been provided by the Saskatchewan Dental Plan and by the Quebec Ministry of Social Affairs, for which we are most grateful.

The data from the BC Pharmacare program, as well as a number of very helpful ideas and comments, have come from Pat Tidball and David Schreck; while Alison Masson of the US Federal Trade Commission provided us with information on their current studies of the industrial organization of the pharmaceutical dispensing process. Staff members at the Saskatchewan and Manitoba Pharmacare programs and at Ontario Blue Cross were also helpful in answering a number of questions.

Hank Klein and Marion Schmidt, students in dentistry and economics respectively, provided able research assistance during the summer of 1975, while Morris Barer carried through all the computer programming and calculations for the analysis of the BC pharmacare data. The dental analyses used a simulation model of a dental practice which has been mounted and kept functioning at the University of British Columbia by Keith Wales. Morris Barer then served as a very careful reviewer and critic in his new role as research officer at the Ontario

Economic Council; we are indebted to him for a number of suggestions and comments which led to improvements. The manuscript has also benefitted from comments by the anonymous reviewers, just as the earlier stages were assisted by the suggestions of participants at the seminars organized by the Council to review project proposals. We are most grateful to the Council for its support in this endeavour.

But there would never have been a manuscript without the careful and efficient typing of Nasim Damji and Millie Penner, who deciphered our coded scrawls and converted them into some semblance of meaning. And finally Sue and Hanne put up with the psychological stresses and strains of the project, as always with understanding, though not always without complaint.

None of the above would wish to accept responsibility for the errors, omissions, or other weaknesses of the finished product – nor for that matter do we. But it is traditional for us to do so.

EXTENDING CANADIAN HEALTH INSURANCE: OPTIONS FOR PHARMACARE AND DENTICARE

1

Public intervention: objectives and criteria

INTRODUCTION

Health care is not free. The provision of health care is an economic activity which uses up real resources, principally human time and energy but also materials, bricks and mortar, machinery, and power. The more of its resources a society devotes to health care, the less are available for any other useful purpose, regardless of the particular institutional arrangements adopted in that society for the organization and delivery of, and payment for care. It is this 'opportunity cost,' of the other useful things given up by a society in order to use its resources in this way, which constitutes the true cost of health care. The problems of determining the appropriate level of provision of resources to health care, and of ensuring that they are efficiently used, emerge under all actual or conceivable social choices of health care system wherever they may be placed along the spectrum from the pure private market place to total 'socialist medicine.'

In Canada, however, a political consensus has emerged which holds that health care, while not free to society, should be free to the individual. This may be expressed as an ethical principle that 'health is a right' to which citizens should have equal access regardless of economic circumstances. Alternatively it can be argued that the private market place in which health services are bought and sold by private individuals like any other commodity is for a variety of reasons a relatively inefficient social mechanism for converting economic resources into levels of health of the population (and presumably therefore into the satisfaction of human wants as the economics textbooks have it). The two positions are obviously different; one is a statement about ultimate values or ends and the other is a judgement about the relative efficiency of different means to an end. Both, however, can be used to justify the choice which has been made in Canada, that the provision of resources for health care production shall be a collective choice, operating through the public tax and expenditure systems of the federal and provincial governments. Decisions to seek care are of course private, individual choices; and decisions over what kind and how much care to provide remain dominated by professionals whose ambiguous role as private businessmen on the public payroll is generating increasing strain. But the hospital and medical insurance programs in each Canadian province ensure that the resources required to support this system shall be raised collectively and that the individual using such services will not have to bear the costs generated by such use.[1]

This principle, however, has not been put into practice across the whole range of health care services. The Canadian national health insurance plan, based for constitutional reasons in each of the provinces, covers only hospital and medical services and does not extend to prescription drugs or dental care.[2] If indeed health care is 'a right,' it seems clear that these are as much a part of health care as the presently covered services. From this point of view, one would see pharmacare and denticare as logical extensions of medicare and hospital insurance, perhaps with some delay while the previous plans are being digested by the governmental administrative and fiscal systems. Within the last three years, several provinces have introduced public dental or pharmaceutical plans, and private insurance for each has been growing steadily – these developments follow the patterns which developed in the decade before each of the previous federal moves into health insurance.

On the other hand, this logical extension may be delayed for reasons partly arising out of experience with the hospital and medical plans. Health care may be 'a right,' justifying some form of intervention in the private market place. But the particular form which that intervention should take is not defined merely by acceptance of the ethical principle. The alternative line of argument for intervention, that the unregulated private market place is not a very efficient social mechanism for allocating health care resources, likewise leaves open the question of how one might structure alternatives, whether one might employ some mix of market and regulatory institutions, and whether the optimal mix might not vary for different types of health care. The particular form of public intervention which has been adopted in the Canadian hospital and medical insurance plans is not necessarily optimal for pharmacy and dentistry – these services differ from hospital and medical care in ways which may well indicate alternative approaches.

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[1] It remains true, of course, that some direct charges to patients are made by physicians who extra-bill. This phenomenon clearly contravenes the 'health is a right' principle, unless all patients have access to non-extra-billing physicians of equivalent capabilities. Nor does it appear to have any economic justification in terms of more efficient use of social resources. There is, however, an interesting distributional effect. If direct charges to patients are grafted onto a predominantly tax-financed system, and if the utilization response to such charges is income-dependent, then partial direct charges will reduce the access of lower-income persons to health care for which they have already paid most of the costs through taxation. Higher income groups who are less sensitive to direct charges will enjoy better access, while having their care subsidized through taxation.

[2] The most recent single source for a description of the Canadian health care system is Andreopoulos (1975), particularly the articles by Le Clair (1975) and Evans (1975a). The hospital insurance plan covers prescription drugs or dental care provided in hospital.

Indeed, the widespread debate on the efficiency and effectiveness of the existing public insurance plans suggests that the present insurance structure is not optimal for hospital and medical care either. The federal government's White Paper, *A New Perspective on the Health of Canadians* (Lalonde, 1974) indicates that the current principal causes of morbidity and mortality are unlikely to be influenced by extension of hospital and medical care as currently organized and financed. Subsequently, the federal government has revised its health care cost-sharing agreements with the provinces (effective 1 April 1977), moving from an open-ended percentage sharing of actual expenditures to a formula related only to provincial population and economic size. One objective of this change is to encourage provinces to be more innovative in improving the efficiency of health care delivery; this may include modifications to the present insurance structure.

Under the circumstances, eventual federal financial underwriting for provincial drug and dental plans can hardly be counted on, and the mixed success of the medicare model suggests that the range of provincial options for public intervention in extending health care coverage be explored fairly carefully before launching any new initiatives to 'round out' universal public health insurance.[3]

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[3] This statement in itself conceals the major assumption that dentistry and drugs would round out such a system. But why draw the boundaries of health care there? Traditionally 'personal health care' in Canada has been defined to include hospital services, medical and dental care, and prescription drugs. But if one adopted the World Health Organization definition of health, very little of human activity is outside the sphere of health care. Should we 'insure' food and shelter? Are they 'rights'? If so, how is the right operationalized; if not, why not? The 'right to health' argument gives no guidance; on the other hand the social mechanism argument would say that we insure hospital care because it has characteristics which lead the free private market to work badly; we do not insure food because it does not.

Once a given program becomes institutionalized it is difficult or impossible to change because vested interests have been created or strengthened in its defense, while the constituency for change has been diluted or destroyed. There is considerable virtue in thinking before acting, rather than after.

The purpose of this present study, therefore, is to provide a framework within which to define and to evaluate the major policy options which a provincial government might consider in extending health care coverage to pharmacy and dentistry. The framework will involve establishing certain criteria which one should apply in evaluating alternative programs. Then, specifically in the context of Ontario, alternative programs for both pharmacy and dentistry will be suggested and described in terms of their expected coverage, utilization patterns, impact on health, and cost and efficiency. In this latter exercise the framework of evaluation is critical – the numerical parameters involved will be defined for the 1975 Ontario population but in many cases will be 'best guesses.' The framework employed will be specific enough that anyone objecting to a particular parameter will nevertheless know where it came from, why it was chosen, and what difference it makes if an alternative is substituted. The end result will be a set of cost estimates and general evaluations for specific alternative public programs in the dental and pharmaceutical field in Ontario. In addition, since the patterns of use of professionals and auxiliaries turns out to be a critical variable in the analysis of both of these areas, an effort is made in chapter six to explore the theoretical basis for the often-asserted bias of private health care practices against the use of less costly and highly trained intermediate level health practitioners. Since the personal services of trained professionals form the backbone of any health services delivery system, the efficiency with which such services are used is obviously a primary factor in comparing alternative programs.

THE OBJECTIVES OF PUBLIC INTERVENTION

The relationship between governments and the health care sector has a long history (see, for example, articles by Hartwell and Perlman in Perlman, 1974). It is sometimes difficult to separate public intervention in the provision of health care from the intervention of health care providers individually or collectively in the public sector, either in the political arena or by direct influence on the executive administrative process. Periodic ritual denunciations of 'socialized medicine' in North America, which have grown quieter in Canada since the national medicare plans were introduced, and calls for 'free and independent' professions with no state interference, have of course never meant anything of the sort.[4] Providers of health care, in Canada as elsewhere in the world, have actively sought out public intervention in the form of legislation regulating both entry to the health care professions and the behaviour of the members of those professions. The only issue has been the extent to which that power should be exercised by the private organizations of the health care providers (in essence the delegation of government power to private organizations), or by politically responsible organs of government. And the key question in that debate is which locus of regulatory power is more likely to exercise its authority in the public interest, and less likely to misuse governmental powers for private organizational interests.

The objectives of this classic form of public intervention into the process of health services delivery were two-fold. At the overt or public level, it was intended to improve the level of health of the public by raising the quality and reliability of the health care provided. It was recognized that individual patients had insufficient knowledge to distinguish good quality care from bad, so the free market was an inadequate regulatory tool. Moreover the state itself did not possess the resources to engage in direct quality surveillance, so it delegated this activity to professional associations and delegated also the coercive power necessary to make this surveillance effective. Tuohy and Wolfson (1976) have analysed the parallel between the informational asymmetry which leads the patient to delegate decision-making authority to the physician or other health professional and the same asymmetry at the societal level which leads the state to delegate regulatory authority to the profession. From the professional point of view, such delegated regulatory power permits the suppression of competitive behaviour both within and from outside the profession. In addition to the obvious economic advantages of such suppression, the self-regulating profession can defend and extend its definition of professional 'territory' to promote objectives which arise as much from professional self-image and identity as from economic self interest. This conflict of interest between public and private objectives in the use of delegated regulatory power has its parallel in the individual physician-patient relation, but it is not unique to situations where regulatory power is explicitly delegated to private associations. The tendency of public regulatory agencies to be captured by the regulatees is a commonplace, and Stigler (1971) has analysed the general economic advantages to the members of an industry from seeking regulation.

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[4] Medical advocates of 'free, competitive practice' usually do not know what they are talking about. Free competition implies freedom of entry and of competitive behaviour. It would require as a beginning, repeal of all practice acts and thus removal of the police authority which supports licensure and ethical codes. The policeman would no longer stand ready to enforce the dictates of the College of Physicians and Surgeons, any more than those of the Chamber of Commerce. Anyone could practice medicine who could find patients, at any price, and could advertise the fact.

Public health insurance represents a major extension of public intervention in health services delivery, affecting in the first instance the users of health care services rather than the providers and addressing directly or indirectly a much wider range of social objectives. These are usually formulated in rather loose terms, such as reducing the financial barriers to health care, relieving people of the economic burden of illness, or generally improving the level of health of the nation. The difficulty with fuzzy or 'motherhood' objectives, however, is that it is rather difficult to specify the relationship between an objective and a particular form or structure of public health insurance organization. Little or no guidance is given on the important problem of how government agencies should choose from the variety of different alternative ways of designing demand-side intervention, a range of options running from simply responding to and reimbursing whatever charges the private delivery system generates, through a variety of intermediate regulatory or negotiation strategies to influence the types of activities performed and the amounts paid for them, to complete public management of the provision of services.[5] Yet clearly the optimal choice of how to intervene in the health services payment process depends on what it is hoped to achieve by such intervention.

There appear to be four major classes of objectives or public purposes which can be influenced by public health insurance, and the extension of such insurance to pharmaceutical or dental care can be analysed with regard to its effects on each. These are: (1) the reduction of financial risk resulting from the possibility of illness and need for services; (2) the transfer of wealth from one group in society to another;[6] (3) the level and patterns of utilization of health care services by patients and potential patients in the society; (4) the relative economic efficiency with which the health care services industry responds to the health needs of society, both by supplying the appropriate services and by producing them at minimum cost.

[5] In principle, one might imagine a public health care delivery system which tried to behave as if it were a private supplier and played the Lange-Lerner game. But the private reference point is unclear – the real 'private' market with licensure, or some hypothetical genuinely free market which has never existed anywhere?

[6] Some commentators have urged that health care allocation decisions should disregard interpersonal distributional decisions because the general tax/transfer system can be used to iron out any inequities. This position emerges both from marketeers who thus defend proposals for coinsurance or other forms of direct patient payment against

Most general statements of purpose can be resolved into one or more of these – reducing financial barriers to care, for example, implies that an increase in utilization is desired, while easing the economic burden of care implies risk-spreading, wealth transfer, or both. But such specific objectives are quite likely to be in conflict, the risk-spreading and wealth transfer benefits achieved by first-dollar universal insurance coverage, for example, may be achieved at a cost of generating excessive or inappropriate utilization, and of eliminating such pressures for efficiency as exist in a market-based health services system. Thus any form of public intervention may have to face a tradeoff between these different objectives, and different forms of intervention may be relatively more or less effective in approaching different objectives. Also the relative importance of these objectives will vary depending on the type of health care services for which a public program is set up. The *raison d'etre* for a children's dental care program, for example, is primarily increased utilization in order to achieve a lower prevalence and (it is to be hoped) incidence of dental disease; redistributive intentions are secondary. On the other hand, public insurance of hospital-based surgical services is primarily motivated by risk-sharing and redistributional objectives, *not* by a desire to increase surgical rates!

A further and more detailed discussion of these four types of public objectives may illustrate how public intervention in the delivery system and payment process for different types of health care will in general be rooted in different objectives, and may as a result suggest different forms of intervention.

THE SPREADING OF RISK

A large proportion of health care needs and corresponding expenditures are subject to uncertainty, i.e., one cannot know in advance how much one will need to spend. Under such circumstances, as Marshall (1920, 841) has pointed out, risk-averse individuals can always be made better off by the opportunity to purchase insurance coverage for an actuarially fair premium. Arrow (1963) developed the idea in the health care context. But it is a very long jump from this proposition to a justification for public health insurance. A number of steps must be filled in along the way.

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charges of regressivity, and from technocrats who view the appropriate objective of the health system as maximizing health, whatever the distributional effects. Such disregard of the incremental distributional effects of new programs is convenient, but naive. The tax-transfer system is simply not flexible enough to mop up the distributional fallout, and this study assumes that one must take account of distributional effects directly in the evaluation of new insurance programs.

The argument begins with the assumption that most members of society are risk-averse, i.e., faced with a choice of a risky gamble or of its mathematical expectation they will choose the latter. Faced with a certain loss of $100 or an 0.1 per cent chance of a $100,000 loss, most people would prefer the former. Insurance companies survive on this preference, which arises from an assumed diminishing marginal utility of income or wealth.[7] The chain of reasoning is best conceptualized in terms of the relation between total wealth or net worth, and welfare, for several reasons. First, the magnitude of losses which are insured against in any one year, such as the burning of one's home or catastrophic illness, may be much larger than any one year's income. Thus net income in the event of (uninsured) loss becomes negative, which makes formal representation of the process less clear. Second, and more significant, the importance an individual or family attaches to income and income loss clearly depends on its underlying wealth position. For two individuals with equal incomes, the welfare impact of a particular loss, and hence the benefit from insuring against it, will be very different if one individual is contemplating possible loss of his entire (small) net worth but the other would lose only 1 per cent of his total wealth. Finally, from a social point of view, the relevant concern of public policy is not income but wealth. We often speak loosely of income redistribution as a social objective, and for reasons of administrative convenience redistributive programs may be based on annual incomes, but a millionaire who has a bad year is not really poor even if his income goes to zero. Nor would most voters support (knowingly) tax-transfer programs to assist such an individual. Obviously there is a correlation between annual income and total net worth; but it is not a perfect correlation. For that reason, all subsequent discussion focuses on wealth rather than income as the basis for distributional objectives even though actual statistics usually relate to annual incomes.

Appendix A, derived from the work of Friedman and Savage (1948), provides a graphical and algebraic demonstration of the discussion which follows, using as an example a household facing a single pair of uncertain outcomes, loss and no loss or illness and health, in the coming year. The probability of loss or no loss, and the size of the loss if it occurs, are assumed known. In such a setting it is easy to demonstrate that the opportunity to purchase actuarially fair insurance against any such risky outcome will always make the household better off. Actuarially fair policies are those for which the premium is just equal to the dollar value of the expected loss (or rather the amount received by the policy holder in the event of loss) multiplied by its *ex ante* probability of occurrence.

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[7] Of course lotteries survive on the converse, an observation which leads to the suggestion that risk-aversion may be a feature only of the utility function below, not above, one's present wealth position, or to the possibility of threshold effects in the utility function, or direct utility effects from gambling, etc. On this issue see Friedman and Savage (1948). The widespread reluctance of consumers to 'gamble with the rent money,' however, suggests the predominance of risk aversion in the face of large uncertain losses.

But this provides no justification for *public* insurance. The obvious advantages of this sort of pooling of risks give rise to private insurance companies marketing insurance against a wide range of contingencies. There exist markets for risk-bearing, in which households or businesses sell risk and insurers buy it, and since risk is not a good but a 'bad' it commands a negative price. To justify public intervention in this market one would have to show that there were some systematic reasons why private risk-bearing institutions fail – alternatively one would have to argue that risk-bearing is not in fact the justification for public insurance programs.

There are several reasons, as Arrow has pointed out, why private markets for risk-bearing might fail to develop in particular areas. Some, but not all, of these situations may call for public intervention on the grounds of approaching closer to optimal social risk-bearing.

In the first place, actuarially fair policies are a theoretical ideal but a practical impossibility because insurance programs, public or private, are not costless. The premium charged must include a loading factor to cover these capital and operating costs. The average policy holder must always pay out more than he/she expects to get back, where the expected return is the probability of loss multiplied by the amount he/she will be paid in the event of loss. The loss to the policy-holder from this loading factor must as shown in appendix A be balanced against the gain from reduction in uncertainty. But if the loading factor is large and/or the gain from reduced uncertainty is small, then insurance may not be worthwhile and a private risk-bearing market may not emerge.

A universal public program may be justified in this situation if the problem is one of high loading factors. The insurance industry appears to be characterized by strong scale economies (see Blair *et al.*, 1975). It may be that in a small community, province, or country, a universal compulsory plan could set its premiums low enough to be 'worth it' relative to the gain in reduced uncertainty, whereas a number of competing private firms could not. (It is assumed, of course, that the public program is covering its full costs in premiums, including the costs of capital and a 'normal' profit rate. Direct and indirect subsidies to public programs may obscure the whole comparison). On the other hand, as shown in appendix A, the gain from insurance depends both on the size of loss (relative to wealth) and its probability. There is little gain from insuring losses which are very small or very frequent. In the limit, losses which are certain should never be 'insured.' Moreover, frequent small losses (large numbers of claims) lead to higher loading charges. So failure of private markets to develop may simply reflect uninsurability of a type of loss, in the sense that the most efficient possible insurance program would use up more resources in its establishment and operation than the gains it would yield in risk reduction. In such a case, public intervention obviously yields no benefits.

The second possible source of failure in private markets for risk-bearing arises from the phenomenon of adverse selection. This occurs because households differ with respect to amount and probability of loss, and because it is obviously not possible in practice for an insurance program to tailor-make policies for each household. Risk classes must be established, with a common premium for each. Within each such class, the lower risk members will be paying a premium which is more actuarially unfair than the high-risk members. If the range of risks becomes too large in a given class, and if enrolment is voluntary, low-risk households may conclude that the loading charge plus the subsidy to high-risk households implicit in the common premium more than outweighs the gains from risk reduction, and may drop out.

Responding to this, private insurance programs will have to raise premiums in order to cover the new higher expected loss per insured household. This tendency will be the stronger insofar as households can judge their own risk status better than the insurer, and insofar as the gains from insurance are small either owing to small losses or owing to very high or very low probabilities of loss. In such cases, a citizen might quite rationally decide not to purchase private coverage, knowing that he/she would thus be joining a pool of the self-selected higher risks, but might vote for a compulsory public program which could offer a lower average premium. If enough citizens made such a choice, private insurance markets would be unable to develop, but a public program might be an appropriate response. Appendix A illustrates how this situation could develop, but also shows that, as in the loading factor case, the public compulsory response is not *necessarily* optimal. It may be better to do nothing.

A third source of possible market failure results from the relation between insurance coverage and the probability of loss. In the insurance literature this is known as 'moral hazard'; the owner whose building is insured may spend less on fire prevention or may even, when business is bad, elect to sell his excess inventory to the insurance company. In the case of health care utilization, however, this concept is indistinguishable from the elasticity of demand. The probabilistic loss which an insurance program reimburses is represented by the utilization of health services rather than by the associated underlying shift in morbidity. (This need not be the case in a theoretical world of costless information; but is obviously true in practice.) Insofar as the relationship between morbidity and utilization is extremely loose, in that it depends on both provider and patient incentives and behaviour, one may expect that the level of utilization for any given morbidity state will rise when the utilization is paid for by insurance. If this happens, the insurance program will perceive the probability of loss as having risen and will have to raise its premium rates correspondingly. The cost of the increased utilization will have to be passed forward fully in premium rates; but its value to users will presumably be less than this cost. Otherwise they would have bought the extra health care when it was not insured. The resulting excess utilization, and associated loss of consumer welfare, resulting from the increased probability of loss must be set against the gain in terms of lowered uncertainty.

The 'moral hazard' problem in health insurance and its relation to demand elasticity were pointed out by Pauly (1968), while Pauly (1969) and M. Feldstein (1973b) have studied the 'excess burden' problem arising from the over-allocation of resources to health care in response to insurance. Their argument rests heavily on the hypothesis that actual utilization patterns for health care are the outcome of consumer choices which are informed in some meaningful sense. This is of course difficult to maintain; in this study we assume, rather, a direct social interest in health care utilization patterns separate from whatever individuals happen to use. This is discussed in more detail later. But it remains true that insofar as the existence of insurance coverage influences risk of loss, a fully rational household might choose not to purchase insurance because the resulting increases in its own and others' utilization could drive total premiums up beyond the combined value of the health services used and the reduction in uncertainty of loss. This form of private market failure, however, has implications for public programs only if there is some reason to believe that the governmental regulatory process is more able to control increases in utilization (e.g., by non-price rationing techniques based on a social standard of need). If the public program can contain 'unnecessary utilization' more successfully than the private, then the 'moral hazard' source of private market failure may justify public intervention.

In pointing to potential sources of failure in private risk-bearing markets, and the circumstances under which these may or may not justify public intervention, it was stressed that there must exist *significant* benefits from uncertainty reduction or costs of uncertainty. In the case of genuinely 'uninsurable' goods or services the costs of the insurance mechanism at its most efficient, including if necessary costs of utilization control and/or compulsion, may outweigh the benefits. A necessary condition for there to be significant benefits is that there should be considerable variation among households in expenditures on particular health services (losses from a particular type of morbidity). It bears emphasizing that, as discussed in appendix A, this is a necessary but *not* a sufficient condition for benefit. If expenditure varied markedly among households but each household knew in advance what its annual expenditure would be – e.g., some are chronically ill, others are not, and this status is well known in advance – then no household is at risk. *Ex post* there will be significant variation in spending across households, but there is no risk to spread and hence no gain from risk-spreading. There may (or may not) be an argument for wealth transfers from healthy to ill, but that is another issue.

In summary, the market-failure case for any form of compulsory public health insurance, whether hospital, dental, pharmaceutical, or whatever, rests on the argument that it 'solves' the adverse selection problem (in the sense described above) and may reduce loading charges through scale economies. Furthermore it is possible that cost and utilization control measures available to governments may limit moral hazard more effectively than private companies can do. (Particularly since much of the utilization response to insurance seems to be the behaviour of suppliers, not demanders of care.) It is thus possible that a rational household might refuse to buy private health insurance on the best available terms, and yet vote for public health insurance. But the justification for compulsory public insurance as an improvement in risk-spreading markets must meet certain tests.

First of all, there must be significant benefits to be derived from the insurance mechanism, in terms of risk reduction, to offset the fact that insurance premiums must generally be larger than the expected risks they insure against. A service may be genuinely uninsurable, if for most of the population it is relatively predictable and/or not very large. In this context uninsurability merely implies that the potential benefits even from ideal or actuarially fair insurance are small. Thus the benefits from insurance of dental care or drugs are inevitably smaller than from insurance of hospital care because the expenditures are smaller on average and much more predictable. Again one must stress that variance in expenditure across households in expenditure does not imply insurability or benefit from insurance *unless* it reflects unpredictability for a given household.

Secondly, there must be reason to believe that a public risk-spreading system could reap whatever advantages are to be gained from insurance at lower cost than a private, that due to scale economies it could incur significantly lower administrative charges or due to compulsory membership it could remove the adverse selection bias and make it worthwhile for lower-risk buyers to be in the system. Such advantages would have to be great enough to outweigh the general undesirability of compulsion.

The criteria for public intervention must be met simultaneously, that is public intervention on risk-spreading grounds requires that there be a significant amount of risk to spread, *and* that the public sector can do it better. Failure of either condition, however, is not an argument against public intervention. But it does indicate that public intervention cannot be viewed as a risk-pooling and uncertainty-reducing mechanism, since that is either unnecessary or better done privately, and must therefore be justified in terms of its effects on wealth distribution, utilization patterns, or efficiency. Insofar as the objectives of public intervention shift away from insurance-type objectives, the appropriateness of an insurance-type intervention mechanism is correspondingly called into question.

REDISTRIBUTION OF WEALTH

A theoretically pure, or ideal, insurance program would have no *ex ante* redistributional effects. If it were possible to charge each household or individual a premium just equal to its own actuarial expectation of loss during the period of coverage, then the expected end-of-period wealth of each household would be unchanged. Introduction of a proportionate administrative charge would of course mean that all households' end-of-period expected wealths would be reduced by this charge, but no one household would be subsidizing another. Of course, *ex post* the insurance mechanism will transfer wealth to households experiencing loss, from those who remain healthy. But if this transfer just offsets the random redistributional effects of illness, then the combination of illness plus pure insurance is distributionally neutral *ex post*.

Redistributional effects develop *ex ante* insofar as premium rates can never be tailored to the risk of the individual household. Premium rates are inevitably determined on a group basis, and in any group there will be a range of different risks depending on the different hereditary, behavioural, and life-style factors which influence the probable mortality of different group members. The premium struck for the group will then represent a relatively large mark-up over the expected loss for low-risk members, with the extra mark-up going to subsidize high-risk members who may well pay premiums less than the expenses they expect to incur. Again it must be emphasized that this is an intra-group subsidy only if high- and low-risk members are identifiable *ex ante; ex post*, of course, some members will have expenditures greater than their premiums and others will have less.[8] This form of *ex ante* within-group subsidy can be reduced over time by private insurers if premium-setting is experience-rated and groups can be redefined without being contaminated by adverse selection; but it inevitably means that non-compulsory private insurers will be unable to cover unorganized persons for whom *ex ante* risks differ widely. Low-risk households will refuse to subsidize high-risk and will drop out, until as shown above the insurance coverage ceases to be worthwhile for anyone.

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[8] But *on average* of course, everyone will pay premiums somewhat greater than expenditures, unless the insuring company has set a faulty rate and taken a loss. The touching belief of members of an employee group newly insured for dental care that they are all going to use more care than the premium costs them is charming – they cannot all be right, and on average they must be wrong.

This inevitable form of within-group cross-subsidy, which arises from incomplete insurer information and can be reduced (but never eliminated) over time by more sophisticated rate-setting, must be distinguished from deliberate cross-subsidies established as a matter of social policy. Public hospital and medical insurance programs, for example, whether based on flat compulsory premiums or financed from general public revenue, involve very large transfers from younger members of the population to the elderly. This latter group is unable to purchase insurance coverage, not simply because of failure in insurance markets (though as an unorganized group with a wide variance in *ex ante* risk their insurance market probably suffers more from adverse selection than any other) but because many of the elderly could not afford a theoretically ideal, actuarially fair policy. If significant groups in the population are unable, on average, to generate the resources to pay for health care technically determined as needed, then clearly risk-spreading will not help. The problem is not risk, but lack of resources. If society as a whole judges, as it appears to have done in the case of health care, that the unattainable services are 'merit goods' which people should have independently of their ability to pay for them, then wealth will have to be transferred from other members of society. One way to achieve such a transfer is to set up an actuarially unfair public insurance program which charges low-risk people much more than their expected use would cost, and to compel them to belong to it; another is to finance the health care system out of tax revenue so that use is unrelated to tax payments and the cross-subsidy becomes buried in the general subsidy patterns of the public tax-expenditure-transfer system.[9]

This deliberate wealth-transfer objective is very prominent in the Canadian hospital and medical insurance programs, and could serve as a justification for extension of such programs to dental care and drugs. One should note, however, that this transfer is of a rather peculiar and special type, being keyed not to income or wealth but to use of certain services. Insofar as age, low income, and illness, for example, tend to be associated, we may approve the redistributional results regardless of which is used as a base. But there are some perverse effects

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[9] It is politically cosmetic, but wrong, to describe this as spreading risk more broadly. Expected losses are in fact being transferred from a relatively well-defined group, who cannot afford them, to another group who can.

– the healthy poor clearly subsidize the affluent ill. And insofar as higher income groups tend to make more use of certain services than lower income, public insurance coverage of those services will involve perverse transfers. Dental care is a case in point; unlike hospital or medical care it is clearly positively correlated with income. Unless such correlation changes under insurance (which private insurance experience suggests it does not, being rooted in socio-economic factors more general than point-of-service charges) then a dental insurance plan would be a wealth transfer plan which transferred from low-income to middle- and upper-income groups.[10]

Since public health insurance programs tend to be either flat premium or tax financed (typically both) with little or no adjustment of contributions to *ex ante* risk faced by the insured, it appears that a deliberate wealth redistribution is inherently part of such plans. In evaluating extensions of health insurance, therefore, one should question the correspondence between the wealth redistribution thus introduced, and the general redistributional objectives of society. The redistributional effects of a public insurance program are inevitably in favour of those with a high *ex ante* expectation of use – insofar as such high-risk persons are also relatively low-income, or have low over-all wealth, or are otherwise considered deserving according to more general criteria, then the program is a good one on redistributional grounds. But such a correlation may in fact not hold. If expectation of use is positively correlated with income/wealth, as in dental care, or simply unrelated to it, as seems to be true for pharmaceutical services (Rabin and Bush, 1976) then the wealth transfer effects of public insurance may be perverse or neutral. In either case, the argument for public intervention on redistributional grounds is undercut. It may be salvaged, if a high correlation between use of a particular form of health care and wealth transfer need can be found for a sub-group of the population – e.g., if among the elderly, low-income people are more likely to be ill (or vice versa) and use drugs, then one could support a partial pharmacare program on redistributional grounds even if for most of the population the *ex ante* redistributional effects were negligible.

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[10] The potent political appeal of such a plan is obvious. It may be objected that this perverse redistributional effect would not apply in the case of universal dental insurance, because utilization of lower-income groups would rise. This issue is dealt with in some detail in chapter four; here we note only that despite econometric estimates apparently showing relatively large responses of 'demand' to price of dental care, experience with prepaid groups to date does not support this idea. Lower-income groups remain non-users even of 'free' care. Nor is this a transitional phenomenon; the British Columbia *Labour Research Bulletin* (June 1975) provides an analysis of a set of industrial dental plan contracts over their first five years of operation, segregated by class of employee. Professional employees are the highest users (about 60 per cent of contracts with a claim in any given year); semi- or unskilled are lowest (about 30 per cent); but the only groups showing any increase in utilization over the five-year period are executive (from 47 per cent to 57 per cent) and skilled labour (from 43 per cent to 62 per cent). Even these increases leave a large proportion of the insured group as irregular users or non-users.

The various forms of redistributional effects mentioned so far all relate to transfers among users of health services, who pay for the costs of the private or public program through taxes and/or premiums, and receive its benefits in terms of reimbursement for health care expenditures incurred. There exists one further form of distributional effect, however, between service users and providers, which arises if the public program leads to upward shifts in service prices associated with increased provider incomes. The effects of public programs, insurance or otherwise, on the efficiency of the health services delivery system is a separate issue to be discussed below. But conceptually one must divide the impact of a public program on health care costs into effects on volume of service (utilization) and costs per service unit, and the latter in turn divides into real resources used to produce each unit of service, and prices paid for those resources. If a public program, by relaxing competitive pressures, modifying expectations, changing bargaining structures, or whatever, leads to higher costs through higher incomes of providers, then these higher incomes represent not a change in economic efficiency but a wealth transfer from tax-payers to providers. Whether this has happened in the Canadian hospital and medical insurance programs is open to argument; the causal relations between introduction of insurance and the associated or subsequent shifts in provider incomes are open to different interpretations. What seems beyond question, however, is that a pure insurance mechanism, universal first dollar, with no controls over pricing by providers, will certainly embody such transfers. Whether one believes income transfers from society at large to health care providers are in accordance with social income distribution objectives or not probably depends primarily on whether or not one is a health service provider. But the possibility of this form of wealth transfer generates an additional justification for public intervention, in that the bargaining relations between a universal public health service plan and a group of providers will be very different from those between a group of private insurance companies and providers – if the latter can be thought of as bargaining in a meaningful sense. If the public sector has preferences or objectives defined over the distribution of wealth between providers and consumers, and is not simply indifferent to whatever redistribution to providers the insurance mechanism may bring about, that constitutes a strong argument for a centralized public program of some sort.

This final redistributional objective is in fact a stronger argument for public intervention than is the objective of redistributing wealth from low-risk to high-risk users. In principle, the latter could be achieved through a private health insurance system combined with subsidy of the premiums of the lower income insured out of general tax revenue, and compulsory insurance coverage. The major problems with such a plan arise from the difficulty of ensuring that everyone is in fact covered – the private system embodies a strong incentive to lose people who are costly to insure due to high-risk or mobile life-style from its beneficiary rolls and so to require government to act as high cost insurer of last resort – and from the problems of cost control in a decentralized privately-run system. Hence in practice it appears that if the public sector wishes to use health programs, insurance or otherwise, as mechanisms for wealth redistribution it must in fact intervene to the level of running the programs.

INFLUENCING UTILIZATION LEVELS AND PATTERNS

The two classes of objectives for public intervention so far discussed, rectification of failure in private markets for risk-bearing and transfers of wealth from one group in society to another, relate to the economic status of the population, not its health. They are none-the-less important objectives; a public program may confer significant benefits if it reduces the degree of economic risk to which the members of the population feel exposed by virtue of the uncertainty of illness, or if it provides a vehicle by which society can transfer resources to particular sub-groups in the population deemed particularly worthy of assistance. But such a program cannot have any impact on the health of the population unless it affects the utilization of health care, either in total volume or pattern or both. An impact on utilization of health care may not be a *sufficient* condition for an impact on public health – the marginal effects of health care on health are increasingly being called into question – but it certainly seems a *necessary* condition.

This should not be taken to suggest that an interest in patterns of health care utilization should exhaust the social interest in health. Health care is only a means to an end; and the true object of social as well as of individual 'health policy' is surely the promotion of health. This may be promoted by a variety of public programs, such as attempts to discourage smoking, encourage exercise and fitness, legislate industrial and environmental safety, etc. The principal thrust of *A New Perspective on the Health of Canadians* (Lalonde, 1974) is precisely that further increases in use of health care may be one of the less effective, or certainly less cost-effective, ways of promoting health. Particularly with respect to dental care, fluoridation of public water supplies is far more effective in the promotion of dental health than any level of dental care utilization. A universal dental insurance plan introduced prior to full community water fluoridation would put a new twist on the old criticism of work-creation programs as 'digging holes in order to fill them in again.' The relationship between dental care and dental health is discussed in more detail in appendix D.

The ultimate ideal level of dental and pharmaceutical care for a society, therefore, is clearly none at all because none is needed. Public health promotional programs independent of health care insurance *may* help to take us in this direction although such an ultimate ideal is clearly a long way off; health care utilization remains merely a means to an end and not a goal in itself. But insurance or insurance related programs, as a sub-set of those public programs which might be used to promote the over-all objective of health, tend to operate through the mechanism of health care utilization. Hence the concentration in this study on utilization, rather than on health; a more general balancing of health care utilization against other health promoting public policies would be a much more ambitious undertaking.

The old justification of health insurance as 'removing the financial barriers to health care' implied that such insurance was expected and intended to increase utilization of care because it was believed that the health of at least some members of the population would respond positively to additional consumption of health care. Insofar as increasing health care utilization is an objective of any public program, the objective must be derived from some implicit social welfare function characterized by consumption externalities for health care and/or some sort of altruism (or, of course, one not based on individual welfares at all). The contrast is obvious between any positive objective of increasing utilization and the tradition in economics which argues that any additional use due to a reduction in point-of-service charges below marginal costs is a net burden on society because the additional care is clearly not valued as highly as are the resources given up to produce it. That argument depends on absence of interactions between individual consumptions and utilities, as well as on several rather implausible assumptions about the functioning of health care markets. But both views of the world are too aggregated. So long as we are analysing the distribution of expenditures on health care, or on hospitals, or drugs, it may be justifiable to treat these as homogenous aggregates. Once utilization *per se* becomes one of the objectives of a public program, however, these broad aggregates cease to exist and one is forced to consider particular forms of health care and particular individuals or groups.

Thus one might perfectly consistently argue that an objective of public intervention in dental care would be to expand utilization of restorative services because the prevalence of untreated dental caries is perceived to be 'too high.' But given the concern over rates of acute care hospitalization in general and rates of surgery in particular in Canada, one would probably not want to defend the hospital insurance program on the grounds that it had met a public objective of increasing the number of surgical interventions. Nor, in the face of growing concern at the level of medication among Canadians, would one urge general pharmaceutical insurance as a mechanism for promoting a general increase in drug taking. It might well have that effect, but presumably that effect would not be the principal justification for the program.

The difficulty with utilization as an objective is that any sensible specification must take account of the fact that at present some types of health care may be in under-supply, but others are surely in over-supply. Worse still, there are in all probability identifiable persons, groups or regions which are under-supplied with care of a form that is in general over-supply, or conversely over-supplied with care that is in general under-supply. One may neglect the fine structure of the utilization problem and speak of general over- and under-supply only in the sense that the available health care resources in any area or at any point of time, if reallocated according to the priorities and objectives of the observer, would be more than or less than adequate to meet some standard of needs. Or, a particular resource may be over- or under-supplied in the sense that more or less of it is available than would be needed if other resources were available in optimum combination. But a policy of attempting to increase or decrease health service utilization in general will inevitably have the defect of exacerbating some existing situation of over- or under-use. And in this context it must be recalled that over-use does not merely generate unnecessary expense. It can have directly harmful effects on health just as can under-use.

This fine structure problem brings out a critical weakness of insurance-type intervention mechanisms. In general, public health insurance simply reduces or eliminates point-of-service charges to the patient; its effect is thus positive across the board with respect to utilization. 'Necessary' and 'unnecessary' use – where necessity is judged relative to whatever external standards underly the definition of public objectives with respect to utilization – are encouraged together.[11] The various forms of 'patient participation' in the payment process, fixed point-of-service charges, percentage charges, and their combinations and variants, are of course no help, insofar as they do in fact discourage utilization (a debatable point, given the powerful influence of health care providers over utilization rates) they discourage necessary and unnecessary utilization alike. Moreover they weaken the performance of any program which includes them on the wealth transfer and risk reduction criteria.[12]

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[11] Of course, if no standards of 'needed' or 'unneeded' services exist external to the provider/patient relationship, there can be no public objectives related to changes in utilization. Whatever is is right, and so is Hegel, but then health insurance has nothing to do with health.

It is of course possible to affect utilization patterns as well as levels through an insurance-type mechanism in the case in which a particular well-defined class of service is perceived to be over-used by *all* patients or providers by the simple device of providing partial or zero reimbursement for that service. For example, one can through the device of an approved drug formulary identify ineffective or harmful drug products or combinations and refuse to reimburse these in a pharmaceutical plan; or one can designate a maximum annual level of reimbursement for dental radiographs on the ground that above this level the procedure is unnecessary or excessive. Moreover it is a strong advantage of public intervention that a public program which refuses to reimburse an unnecessary service can place the cost on the provider who has discretion over that provision, rather than the patient who generally does not. A service judged unnecessary and unreimbursed by a private insurance plan may well be billed to the patient anyway, thus imposing the penalty for overuse on the wrong decisionmaker.

But such clearcut cases are rare. It would be difficult to refuse reimbursement for tonsillectomy and adenoidectomy, or for cholecystectomy, on the ground that perhaps half of all such operations performed are unnecessary. If that is true, the other half are not. And a public agency which confines its intervention to reimbursing claims has no way of determining *which* cases represent over-use. The same is true of prescription drugs – tranquilizers may be heavily over-used but one could hardly refuse to reimburse any tranquilizer prescriptions. The general effectiveness of dental preventive services – prophylaxis, topical fluoride application, and particularly education – is open to doubt, particularly when carried out in a large number of uncontrolled and unevaluated private office environments. Yet it is probably effective in some cases, provided by some practitioners – which? An insurance mechanism, public or private, provides no way of finding out, such that it would reimburse only the effective.

On the other hand, public intervention which goes beyond reimbursement to attempt to change the management of the health care system, either by direct public participation in the delivery system or by influencing the organization and reimbursement process to change existing management structures, may by changing provider priorities affect utilization patterns in a more detailed way. Insofar as public objectives with respect to health care utilization are formulated in a detailed way as requiring changes in the relative frequency of performance of particular services or changing the types of services performed, it appears inevitable that such objectives can be served only through some form of public intervention which involves a direct influence on the management of the health care system. Conversely, the only utilization objectives which can be served by an insurance-type public program are the very broad ones of encouraging more use of everything by everybody, with the exception of specific services which can be defined as unnecessary for anybody. At the present time, it would be hard to defend such a broad-scale 'more' objective for health care in general as conducive to the increased health of the target population. In particular, in contemplating the extension of public intervention into the dental and pharmaceutical services market it must be questioned whether or not a general increase in drug taking and use of all types of dental services is a sensible public objective.

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[12] The argument for 'patient participation' or deterrent fees often rests on an implicit assumption that patients are capable of determining the relative 'necessity' of different forms of utilization and of controlling them such that the least 'necessary' forms of utilization will be reduced most in response to direct charges. The assumption is sufficiently implausible that it is rarely made explicit, but if it were in fact tenable it would imply that the patient is the appropriate judge of necessity of use and therefore there exists no public utilization objective.

Of course one may read the evidence to conclude that utilization responses will not in fact be very large – but in that case presumably the utilization objective is not the justification for public intervention. Or one may argue that improved initial and continuing education of health care providers will improve utilization patterns, and specific policies to encourage or discourage locational choices of providers may improve the regional balance of services. And indeed such policies may well work – but they do not require a general policy of public intervention. If the problem is specific, then the solution can be also. But an argument for a general public intervention in a particular health care market on the grounds of improvement in utilization levels or patterns would seem to require that the form of that intervention be such that it is likely to be able to bear on the perceived problems embodied in present utilization patterns. The more detailed and specific these problems are perceived to be, and the more they are problems of over-utilization rather than under-utilization, the more necessary that such public intervention go beyond 'paying the bills' and seek to change the management of the delivery system itself.

IMPROVING THE ECONOMIC EFFICIENCY OF HEALTH SERVICE DELIVERY

Any intervention by the public sector into the delivery of health services has a high probability of affecting health care costs. Extension of this intervention to pharmaceuticals and dental care is no exception. However, as developed thus far, effects of intervention on costs have at least three dimensions. Public intervention may affect utilization rates, which may represent an objective in and of itself. It may affect prices of services by changing the prices paid for the resources used to produce those services (chiefly provider incomes but in the case of pharmaceuticals possibly also drug company revenues) which represents strictly speaking a transfer from taxpayers to providers rather than a change in the resource cost of health care. And finally the real resource cost of the services provided may be changed as a result of public intervention. It follows that an objective of any public health care program is, or ought to be, the structuring of intervention so that the provision of health care is carried out as efficiently as possible. Use of excess resources to produce a given product or service impoverishes the whole community.

This particular issue has tended to be discounted in discussions of public health service programs, both from the economic and from the health care side. Health professionals have tended to treat the actual process of production of health care as if there were only one best way of producing any particular service, and as if the relative efficiency of that process of production were quite independent of the structure of the payment mechanism. More surprisingly, a significant strand of economic analysis of health insurance has focused on the demand side and assumed that the production of health care was carried out at 'long-run constant marginal cost' and priced at that level. Yet it is a commonplace of micro-economic theory that the postulate of cost-minimizing behaviour by producing units depends at root on further assumptions about provider objectives and/or market structures. One may assume that providers are inherently maximizers of profits and have no other interest, or that product or capital markets are perfectly competitive so that only profit maximizers survive, or one can build up a special combination of objectives and constraints to yield cost-minimization (such as sales maximization under exogenous demand curve and profit rate constraint). But where these underlying assumptions are relaxed, the cost-minimization assumption becomes difficult to support. This problem is particularly acute in the production of health care services; a combination of professionalization and small self-employed producers makes both pure profit-maximization and perfect competition highly implausible assumptions *a priori* and generates empirical observations inconsistent with cost-minimizing behaviour.

As a result of the extensive market imperfections which result from professionalization, comprising limitations on entry, choice of production technique, and pricing or other dimensions of competitive strategy, the relative efficiency of the private health care market-place is open to question. It should be noted, however, that all such imperfections are rooted in the classic form of public intervention in health care, the delegation of state authority to private professional associations. The state buys quality assurance at the price of market imperfection, in the sense that it permits these associations to impose private regulation on the health care market in return for their undertaking some responsibility for the competence of providers. Recognition that such quality assurance comes at a price does not necessarily imply that the bargain is a bad one. It may or may not be, depending on how severe and costly are the resulting market imperfections and on what alternatives if any might exist for quality maintenance in health care. (And, of course, on the degree of effectiveness with which private associations in fact carry out the quality control function).

But it must be recognized that further public intervention has the potential for making the market imperfection problem yet more severe. As the point-of-service charges paid by consumers are reduced, such market constraints on providers as exist in the private health care market disappear. Under universal first-dollar health insurance, no constraints whatever exist on prices and costs of production of services. Just as quality assurance was bought at cost of market imperfections, so risk-spreading and/or wealth transfers are bought at cost of complete elimination of market-type forces either encouraging efficiency in production or limiting provider incomes in health care.

Now of course this is an incomplete and inaccurate view of what really happens when public health insurance is introduced. Since the fact of removal of market constraints is obvious to all concerned, administrative mechanisms are introduced by which limitations on prices and to a lesser extent utilization patterns can be negotiated. The effectiveness of such mechanisms in limiting factor incomes under public health insurance is debatable, particularly since control over utilization patterns is incomplete; but the record of medicare in Canada has been interpreted as showing that such administrative mechanisms can effectively substitute for market forces in controlling provider incomes.[13] Moreover in the hospital insurance program it appears that administrative controls may be relatively effective in freezing the existing technology and inhibiting the rate of increase of staff and equipment serving a given population base.

[13] This is an optimistic interpretation, and there are others, but it is defensible at present. Such control depends critically on the relative negotiating strength of providers and reimbursing agency – as noted above, a centralized public agency will be much stronger than divided private companies. Moreover, providers who rely on insurance reimbursement for only part of their income will be stronger than those who supply a universal program. And finally, the tightness of service definitions bears on the capacity of providers to multiply or re-define services to generate *de facto* price changes beyond those negotiated.

It does not appear, however, that administrative mechanisms are effective in creating incentives for improving the existing technology. If the negotiation process establishes a sort of health care incomes policy, such that provider incomes can neither rise too high nor fall too low without adjustments in corresponding service prices, then no pressures can develop for increased efficiency in production. A pharmacare program, for example, which pays a uniform professional dispensing fee high enough to maintain an appropriate average income per community pharmacist (and it is this income rather than the dispensing fee, which will become the real subject for negotiation) will have no way of creating economic incentives for the use of pharmaceutical technicians but will pay professional fees for 'counting and pouring' indefinitely. In the same way, the medicare structure inhibits the deployment of nurse practitioners because it provides no mechanism whereby their use can be economically profitable for the physician. Thus it appears that extension of public intervention of the health insurance type into an area of health services can include administrative structures to prevent runaway provider incomes (at least after the first once-for-all gains at the time of introduction); but freezes in place whatever technical inefficiencies in production may have existed at the time of introduction. Moreover it is likely to inhibit or prevent completely dissemination of any new gains in technological efficiency, particularly those based on use of new classes of manpower, which develop subsequent to the public intervention. (The theoretical underpinnings for this empirical generalization are developed in chapter six).

If technological inefficiency is in fact a key weakness of public intervention in health care which relies on a combination of insurance-type mechanisms and administrative controls over prices, two alternative classes of policy response are available. One possibility, of course, is direct public provision of services. A conventional argument against public provision is that the incentive structure faced by private providers is likely to lead to higher productivity and therefore greater efficiency than in a public service. This may be true, but if so it applies only for a *given* mix of inputs used and range of outputs produced. If the incentive structure faced by private providers leads to over-production of certain types of services and/or over-use of certain high-cost inputs (particularly own-time of the highly-trained professionals who control the management of most provider firms) then it is quite possible that any productivity losses from public provision can be outweighed by choice of a more effective service mix and a more efficient input mix. The critical factor is not necessarily governmental ownership, but rather separation of the management and professional services function; US experience suggests that some at least of the privately-run (but not professionally-owned) health maintenance organizations have been able to improve technical efficiency in both input and output dimensions. The BC Childrens' Dental Health Project (1974) estimated that a school-based public children's dental care program built around intermediate level dental personnel performing routine restorative care could operate at about 60 per cent of the cost of a private practice plan. Even assuming that the productivity assumptions in the school-based program were over-optimistic this leaves a very large margin of error. McCaffree and Newman (1968) report that the Seattle Group Health Co-operative succeeded in reducing pharmaceutical expenditures *per capita* per year by about one-third through a combination of auxiliary use and more careful prescribing. Thus the orders of magnitude of potential savings are quite large.

Alternatively, there exists the possibility of strengthening market-type forces on a selective basis. Examples of this option have already been given. The refusal to reimburse expenditures on unapproved drugs represents a policy of using differential prices (positive as against zero) to discourage use of ineffective or harmful drugs, and also illustrates the important informational as well as incentive effects of prices. The possibility exists, however, of using market forces more generally to increase efficiency in pharmaceutical dispensing, as will be outlined below, for example by permitting pharmacists to set their dispensing charges independently and to advertise this charge, and requiring patients to pay it. In general, wherever a patient confronts an option to use or not to use a particular service, or to use a service from one provider rather than another, market signals can be used to guide the choice *if* the patient can reasonably be expected to evaluate the consequences of the choice. Thus one may quite consistently expect a patient to choose among equivalently qualified dispensers of the same drug on the basis of a comparison of the different dispensing fees they charge relative to the proximity, convenience, and other services they offer, or to choose between having an immunization injection performed free by a public health nurse and paying a fee to a private medical practitioner for the same service. This would not imply that a patient should be expected to choose whether or not to undergo a variety of different diagnostic tests, on the basis of their cost to him/her – the patient has no way of evaluating the payoff from a given test. But whenever (and only whenever) a free choice exists between therapeutically equivalent services, which differ along non-health dimensions, a strong argument exists for permitting the patient to make this choice and requiring him/her to pay the costs associated with a more expensive choice.

In such situations powerful incentives to improve technical efficiency can be brought to bear on providers, because the identification of *therapeutically equivalent* choices faced by patients implies that the professional restrictions on competitive behaviour by providers (particularly price competition and advertising) can be removed. The potential then exists for more efficient providers to capture larger markets (and conversely for the less efficient) and thus for over-all technical efficiency to improve. But it is critically important that any increase in the scope of consumer decision-making in response to price signals be supported by corresponding public programs to ensure that consumer choices are in fact made from among therapeutically equivalent alternatives. Expansion of the role of price competition in pharmaceuticals, for example, presupposes both public quality control programs for drugs themselves such as the federal QUAD program, and also some form of 'downstream monitoring' to maintain the reliability of the dispensing process. Both of these forms of quality control are beyond the capability of the consumer/patient, whether or not responding to price signals. Mechanisms must exist to ensure that as providers are encouraged to increase their technical efficiency in the provision of care, they are prevented from cost-cutting by dilution of the quality of services provided. In this context, of course, quality must be measured in the downstream or outcome sense of impact on the patient's health – structural or process measures beg the entire question. If one defines a particular structure of the provider unit as 'quality,' e.g., a particular ratio of top-level to intermediate level professionals or a particular set of task assignments to different professionals, then definitionally any change toward increased use of intermediate-level personnel is 'quality' dilution. But such a quality definition is of no particular relevance to public policy unless it can be shown to be uniquely related to the quality of outcome of the care provided.

It is undoubtedly true that for many types of health services the problem of outcome measurement is far too complex to permit one to rely only on outcome quality as a measure of system performance. In the provision of such services, competitive forces should never play more than a limited role, if any, compared with professional and administrative structures and regulations. Similarly, for a number of types of health services, the information discrepancy between provider and consumer may be such that no useful role can be played by consumer decision-making as to what services to receive, whether or not the choice is influenced by point-of-service charges. But these characteristics of inadequate or non-existent outcome measures and/or large information discrepancies between consumer and provider, while they may be the distinguishing features which mark off health services from economic commodities in general and make them 'different,' are not at all true of *all* health services. There exist a significant number of health care services or products which are or can be sufficiently well-defined that the consumer can be assured of receiving the same product (in the health care impact or 'quality' dimension) from different providers.[14] In these situations, there may be significant advantages in encouraging consumers to choose among different providers on the basis of differential price information.

Such advantages go beyond the potential gains in productivity and technical efficiency which may be observed or estimated from studies in the existing literature on health care delivery. A competitive market is a powerful generator of new information about techniques of production and about consumer preferences. McCain (1975) discusses this information-generating function by analogy with the concept of redundancy in information theory, as a way of ensuring the passage of information through inherently 'noisy' channels. Large numbers of firms generate more information about different production processes and their respective strengths and weaknesses; open differential pricing helps to transmit that information among firms; and consumer responsiveness to prices creates an incentive to firms to make use of new technological information. At the same time, of course consumers are enabled to reveal the values which they place on the different characteristics of products by paying or refusing to pay for their cost of production. In the provision of health care this last form of information-generation is modified by the prior social decision that there are many characteristics of health services which consumers are not competent to evaluate and among which they should not be offered a choice. But there are also many characteristics of which this is not true, and where the suppression of the expression of consumer preferences is both inefficient and unjustifiable on grounds of health protection.

SUMMARY

The possible extension of the Canadian health care payment programs to cover dental services and prescription drugs for all or significant proportions of the population raises the question of the role or purpose of such programs in terms of social objectives, and for that matter the same issues can be raised with respect to hospital and medical insurance programs and any proposed modifications thereof. Public intervention of some form may be justified by some general social consensus that 'health care is a right' which people should not have to pay for. But regrettably it is not possible to have health care or very much else without paying for it.[15] And such general feelings leave open the question of the appropriate form of intervention, which should depend on more precise specification of objectives. In other words, it helps to know what you are trying to do before you decide how to do it.[16]

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[14] The 'or can be' insert is important here. The scope for use of the price mechanism in health services delivery as a mechanism for enhancing technical efficiency is critically dependent on the range of services for which outcome quality measurement is possible. And since the evaluation of outcome by patients/consumers is notoriously unreliable for specific services and treatments, any increase in the role of competitive forces based on advertised differential pricing by providers must be associated with expansion of programs of external outcome evaluations of health services. Such evaluations are probably desirable in their own right as programs to improve the quality of health services being provided in Canada; the pace of change in health services delivery has outdated the old structural form of quality control which consisted of requiring providers to undergo a long intensive period of 'professionalization' and then turning them loose for thirty-five years. Hospital practice provides some potential quality review for physicians, but no one seems to know or care what dentists, for example, do after they graduate.

We have therefore postulated four major categories of objectives which public intervention in health care delivery could be presumed to be intended to achieve: (1) remedying failures or inadequacies in private markets for risk-bearing, (2) redistributing wealth from social groups with low *a priori* expectation of health care expenditure (of a particular type) to those with high expectation, or between health care providers and consumers; (3) changing the level or the pattern of utilization of health care services; (4) improving the technical efficiency with which health services are provided and thereby lowering their cost.

These objectives tend to conflict with each other; in particular measures to achieve (1) and (2) tend to create problems with respect to (4). But the main issues with respect to policy choice arise first because different types of health services 'load' differently on these four objectives, and second because different forms of intervention are more appropriate to achieve different objectives. As examples of the first, risk-spreading is a more important objective in intervening in hospitalized surgical services, where most people generate no expenses in a given year and some few generate very large ones, than in dental care or prescription drugs where a large proportion of the population incurs small or moderate annual expenses and very large expenses, of the order of magnitude of a standard hospital stay, are (almost) unheard of. On the other hand, technical efficiency is a more important objective in dental care and pharmaceuticals, where the potential for a major expansion in auxiliary use is established, than in, e.g., surgery where the rate of performance of surgical operations has often been called into question in Canada but their technical efficiency generally has not been. The wealth transfer objective is served very differently by public intervention in dental care (where use is correlated positively with income) compared with hospital care where the correlation (through the age variable) is negative. With respect to utilization, one might reasonably want to increase dental care use in general (particularly among children), but decrease drug taking; and presumably any sensible public objectives formulated with respect to utilization of any health care service would go beyond 'up' or 'down' to include selective increases or decreases in utilization of specific types of services or drugs in response to collective professional judgement.

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[15] It is not true that *everything* worth having must be paid for, as Titmuss (1970) has shown. It is an economists' solipsism to regard value as a uni-dimensional phenomenon, so that all values can be converted to a dollar scale; other people know better. But it is generally, if not universally, true that 'there ain't no such thing as a free lunch.' The issue is not whether people should pay for health care but how they shall pay for it and who shall pay what amounts.

[16] This must be admitted to be a statement of faith, not an empirical generalization based on actual public programs.

Having established (implicitly or explicitly) relative weightings for the different public objectives in a public health services program, one must then recognize the relation between different objectives and different forms of intervention. Insurance-type programs on the medicare model are well adapted to risk-spreading (1) and wealth transfer (2) objectives; they are distinctly inimical to efficiency (4) objectives and have only the crudest effects (more or less up or if uninsured, out) on utilization (3) which may be good or bad depending on what one thought the problem was to start with. Because of their ill effects on (4) (and to a lesser extent (2), wealth transfers from taxpayers to providers), insurance mechanisms are supplemented by an administrative framework to regulate service prices and provider incomes, and to impede cost-enhancing changes in modes of production or rates of utilization. Such administrative frameworks seem ill-adapted, however, to encourage cost-reducing innovation in production or to affect the fine structure of utilization patterns. By contrast competition-enhancing policies which permit differential pricing by providers, made known to consumers, and paid at least in part by consumers, have the strongest potential advantages in enhancing efficiency if used selectively and combined with public quality-assurance programs. Inevitably, however, such policies give away ground on objectives (1) and (2) because they require consumer/patients to pay part of the cost of their own services. Competitive policies provide some indirect leverage on utilization through associated quality control programs and through their potential for selectivity of effect, they can be less relentlessly 'up' than insurance mechanisms. Finally, public ownership/management of the delivery system itself can meet objectives (1) and (2) as fully as insurance mechanisms, and has the potential for better fine tuning of utilization than either insurance or competition. A school-based public dental service, for example, seems the only way to achieve very high rates of dental utilization by children, and the evaluation and adoption or discard of different types of service procedure is obviously more efficient *in principle* in a centralized system simply because evaluation is a specialized task requiring comparisons within large samples and is generally impossible at the individual practice level.[17] And information on the outcome of evaluation is more readily transmitted in a centralized organization. Against these advantages, of course, must be set the practical problems of institutional ossification, or of bureaucratic identification with a particular way of doing things, and the balance is not clear.

The same ambiguity arises with respect to the fourth objective of technical efficiency. Public ownership and bureaucratic operation are not, in the conventional wisdom, optimal structures for the achievement of efficiency. A public agency could perform very badly on objective (4). But equally, if potential technological improvements are well-known and straightforward, if criteria of efficient performance can be established in an unambiguous fashion, and if systematic disincentives to efficiency exist in the private sector; then it is quite possible that a public delivery system could be more efficient than the private sector.[18] The particular organization and 'mission' of the public service is critical. But the relative balance is surely influenced by one's *a priori* judgement about the degree of inefficiency, if any, built into the private sector. And in the end, the choice of policy has to be guided by a balance struck among all the public objectives to be served, as well as the private agenda of public decision-makers and the over-arching guesstimates of political feasibility.

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[17] Notwithstanding the enthusiasm of some health practitioners, utilization of a technique or drug by an isolated untrained amateur (in experimental design) on a couple of dozen patients is not an optimal test of efficacy.

[18] In this context it should be remarked that in the military sphere, the public sector demonstrated a conclusive superiority in technical efficiency during the 17th and 18th centuries, and the relative inefficiency of private armies was established by an evaluative technique whose results are hard to challenge. The parallel between health care and warfare need not be pushed (although life-and-death outcome, social overriding of consumer preferences, hierarchical structure, and high level of uncertainty are suggestive); the point is simply that the public sector is not *always* less efficient. Doherty and Hussain (1975) report an analysis of a public dental care program whose technical efficiency compares favourably with the private sector.

2

Pharmacare and its alternatives: insurance options

INTRODUCTION

In Canada, the normal evolution of public concern in the health care fields seems to run from problems of access and payment for services, through the development of private and then public insurance systems which reduce or eliminate point-of-service charges to patients, and finally focusses on issues of overutilization, cost, and inefficiency. This cycle has been worked through in hospital care, more recently in medical care, and seems at present to be stalled part way in dental care. Second thoughts induced by the concern over high and rising hospital and medical costs, combined with a general atmosphere of fiscal stringency, may be slowing the transfer from private to public insurance. Pharmaceutical services, however, have a somewhat different history. Concerns over costs and efficiency of drug distribution predated the development of payment plans. In particular, assertions of excessively high prices and profits and wasteful over-expenditure on marketing by the large manufacturing firms of the drug industry have generated public investigations and academic commentary for nearly twenty years. More recently, particularly in the United States, the industrial organization of the dispensing process has generated similar criticisms of excessively high prices resulting from over-capacity and inefficient use of professional manpower in retail pharmacy. The relatively rapid recent development of public drug purchase plans for the elderly has thus been superimposed upon an industry in which significant concern already existed about efficiency and the absence of competitive behaviour at both manufacturing and retail levels, and it is clear that public insurance plans in this area may seriously exacerbate these problems.

The very statement of a problem in these terms highlights the distinction between pharmacy and, say, medicine or dentistry. Generally one thinks of the output of the health industry as being health services. Pharmaceutical services, however, are inextricably bound up with the supply of a product – prescription drugs.[1] The manufacturing of this product is an activity solidly rooted in the private market-place, carried on by privately-owned corporations whose *raison d'être* is generation of profits.[2] Dispensing is carried out primarily through retail pharmacies in which the inherent ambivalence of the role of the self-employed professional is exposed much more clearly than in the other health disciplines. The pharmacist is a businessman, running a store, selling a variety of products some of which are health-related. The self-employed physician or dentist is, of course, also a businessman, selling a service, and the conflicts which this generates with the professional role are no different in principle. But the pharmacist sells a product, not a service, and moreover sells a number of non-health products as well. In consequence both the range of activities carried out by the pharmacist, and the perception of the pharmaceutical role by the public and by pharmacists, are much more weighted toward the business of retailing than the profession of providing pharmacological advice.[3]

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[1] 'Inextricably' may be too strong. The idealization of the pharmacist's role as pharmacological specialist on the mythical health team represents that role as the provision of specialized therapeutic knowledge which might or might not include provision of a specific drug. This role may be approximated in some hospital pharmacies and is suggested as a possible advantage of the community health centre (Torrance 1972). It has no relation to the realities of community pharmacy, however, as in that environment patients buy drugs from a pharmacist who is an independent private businessman. Any professional expertise or advice which may be provided is associated with the dispensing of the prescription.

[2] Public service, the nation's health, generation of new research information and new drugs, product quality and safety, all are possible proximate goals insofar as they serve the long-run profit objectives of the firm, and for public relations or advertising purposes these intermediate goals are highlighted. A clear statement of their relation to ultimate objectives is provided in the March 1976 issue of *Fortune*, 'Around the Company's (Merck & Co.) headquarters in Rahway, New Jersey, there is so much high-minded talk about Merck's life-saving mission that one might consider the company an eleemosynary outfit. But this misimpression is never conveyed in conversations with Gadsden (president of Merck since 1965) who is as devout a disciple of the bottom line as ever there was' ['Merck strains to keep the pots aboiling']. A similar message is conveyed by Sanford Ungar (1972), 'Get away with what you can,' describing the trade-off between profit and product safety struck by Richardson-Merrill, Inc. in the development of MER/29; and the Parke-Davis handling of the antibiotic chloramphenicol (Chloromycetin) by downrating its potentially lethal side effects in pursuit of sales is described in Silverman and Lee (1974, chap. 12). Walker (1971, chap. 4) provides further specific examples of the dominance of the profit motive. Illich (1976, 63-76) also provides an extensive set of recent references.

The business side of prescription drug delivery is thus much more prominent than it is in medical and dental services, and therefore must be featured more prominently in the specification and analysis of government options in payment for prescription drugs. In particular the present or potential role of market forces in promoting or opposing public objectives, and the way in which these forces will interact with different reimbursement structures, must be taken into account in some detail. As a result, this study will place heavy emphasis on the efficiency of the drug distribution system and its relation to the cost and efficiency of various alternative prescription drug plans.

In thus accepting the *status quo*, we recognize that a more fundamental reshaping of the health care delivery system, changing the roles of both physician and pharmacist and separating entrepreneurial and professional functions, might lead to a much superior drug delivery system. (See, e.g., note 1 and other references below). But this takes us well beyond the scope of the present inquiry; much more than a change in pharmacy itself would be necessary.

The analysis can in fact be split roughly into two parts. First, we hold constant the delivery system and consider various ways of defining the beneficiaries and benefits of a public drug plan. Beneficiaries may be the entire population or variously defined sub-groups. Benefits may be complete reimbursement of all prescription drug charges; they may be limited by class of drug or by requiring the patient to participate in the payment. Various alternatives will be defined, approximate relative costs developed, and the results assessed according to the criteria developed in chapter one. The second stage will then require relaxation of the assumption that the delivery system, which includes the physicians who prescribe drugs as well as manufacturers and dispensers, will be unaffected by the extension of drug insurance. This analysis will be carried out in chapter three.

Any major change in the payment process will inevitably generate a response in the delivery system as well; the public agency introducing such a change can, however, adopt either a passive or a positive strategy toward this change. A passive strategy could be defined as attempting to identify and moderate or contain any system responses. The objective would be to maintain pre-insurance prescribing and drug use patterns, modes of organization of dispensing, and drug prices, 'as if' no change in the payment process had occurred. It would be a more sophisticated version of the naive Hall Commission position (Canada, 1964), that an insurance plan could be introduced without 'any control over the physician or dentist in the practice of his calling' – that is obviously impossible. But one might try to shape controls so that the resulting supplier behaviour would be similar to what would have occurred in an uncontrolled, uninsured system. A more positive strategy, however, would involve formulation of specific public objectives for change in the delivery system itself, and use of the payments process as part of a set of measures to achieve these changes. Thus we will consider, on the basis of the general public objectives of chapter one, what a public agency might wish to achieve in the organization of drug delivery and what changes it might wish to make to achieve these ends. In particular, we will try to estimate what sort of economic benefits might flow from a more positive strategy. The various policy tools available to the public agency in pursuing these objectives can be classified into administrative controls on the delivery system, promotion or modification of private market mechanisms, and direct intervention into the delivery process. It will be seen that the effectiveness of these alternative tools cannot be assessed in general, but that different components of the delivery system appear to be manageable by different tools for fairly clearly defined reasons.

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[3] Advertisements in professional pharmaceutical journals, which are aimed at the businessman, form an interesting counterpoint to the 'professionalism' of editorials and articles. But the most energetic proponents of a 'new role' for professional pharmacy, e.g. the C.Ph.A.-sponsored Commission on Pharmaceutical Services (1971), nevertheless reveal (chap. X) that the provision of professional advice is a very minor part of the activity of a community pharmacist compared with 'counting and pouring,' and selling Kleenex.

A COMPREHENSIVE PROGRAM – COST ESTIMATES

One possible approach to prescription drug insurance would be to parallel the existing Canadian hospital and medical insurance programs and to provide coverage to all residents on a first dollar 100 per cent basis for all prescription drugs. Pharmacists would submit claims for all prescriptions filled to a central payment agency, and patients would face no point-of-service charges.[4] On the initial assumption that such a program did not lead either to an escalation of

[4] In some provinces medical coverage is not in fact 100 per cent because certain physicians opt out of direct reimbursement and extra-bill at rates above provincial fee schedules. Conceivably some pharmacies might prefer not to participate in a universal plan, and to charge patients directly subject to full or partial subsequent reimbursement of the patient. It is assumed that few if any pharmacists would find this a profitable strategy. For that matter, no justification on health or economic grounds has ever been provided for physician extra-billing either – except of course the economic interests of physicians.

prescription prices, or to an increase in the rate of consumption of prescription drugs, the estimation of costs for such a program in Ontario is in principle fairly straight-forward. Taking 1975 as a base year, the July 1975 population of Ontario (Canadian Statistical Review, March 1976) was 8,237,000. One could simply multiply this by estimated annual expenditures *per capita* for prescription drugs in Ontario, and add a factor for the administrative costs of the program. Alternatively, laying the groundwork for estimates by sub-groups, one could estimate the annual rate of prescription use *per capita* and multiply this by the average cost per prescription and by provincial population, again adding administrative costs. The second method has the advantage of breaking out more explicitly the factors underlying the estimates, which can then be adjusted to allow for changed program specifications. On the other hand it also requires more data than the aggregate expenditure method because it requires utilization statistics with population denominators rather than just aggregate data which can be derived from retailers' records. Both approaches suffer, at present, because 1975 data are not yet available for most variables of interest. The actual estimation process employed over the next few pages is outlined in Figure 1.

The latest aggregate expenditure data for Ontario are provided by the Department of National Health and Welfare publication, *National Health Expenditures in Canada, 1960-73* (April 1975). This gives 1973 prescription drug expense for Ontario as $188,817,000. Total Ontario population on 1 July 1973 was 7,958,000, so the estimated *per capita* expenditure on prescription drugs was $23.73. The annual rate of increase of prescription drug expenditures *per capita* in Ontario has been 8.97 per cent per year from 1960 to 1973, with relatively rapid increases from 1965 to 1970 (13.5 per cent per annum) and somewhat more restrained increases from 1970 to 1973 (7.04 per cent per annum). A conservative estimate of the 1975 figure would then be reached by assuming 7 per cent per year increase from 1973 to 1975, or, $\$23.73 \times (1.07)^2 = \$27.17$ *per capita*. On the other hand, the rate of increase in the 1970-73 period is pulled down by a very small increase in 1971-2. By 1973 the rate of increase was picking up again. Moreover inflation has proceeded much more rapidly in 1974 and 1975 than in previous years, and prescription drug expenditures have maintained a very steady relation to personal income over the years. Personal incomes *per capita* in Canada rose 14.30 per cent 1974 over 1973 and 12.96 per cent 1975 over 1974. Thus a rate of increase of prescription drug expenditure *per capita* of 10 per cent per year is more plausible than 7 per cent, and 12 per cent is not unduly high. These yield, respectively, $28.71 and $29.77 *per capita* as estimates of Ontario prescription drug expense in 1975. On a population base of 8.237 million, these estimates yield program costs for benefits alone of $236.5 million and $245.2 million exclusive of administrative costs.

Figure 1
Stages of estimation of total costs for a universal pharmacare program, Ontario, 1975

I (p. 37) Project 1973 *per capita* prescription drug costs in Ontario ($23.73) to estimates for 1975 ($28.71–$29.77) and multiply by estimated mid-1975 provincial population (8,237,000) to yield $236.5–$245.2 million.

II (p. 39) Attempt direct estimation of average cost per prescription using (1974) data from the Canadian Pharmaceutical Association, Ontario Green Shield and Blue Cross, BC Pharmacare, and Quebec RAMQ. Preliminary estimate of $5.50 per prescription for 1975.

III (pp. 39-40) Calculate implied annual utilization rate, dividing $5.50 into $28.71 yields 5.22 prescriptions *per capita.* Comparing this with data from Green Shield, and older C.Ph.A., Canada NHW, and US data, it appears too low.

IV (pp. 39-40) Partial insurance program data have many biases. But the rates of prescription utilization increase *per capita* implied in the 5.22 estimate also seem inconsistent with C.Ph.A. reports of prescription sales growth.

V (p. 74) It appears that $5.50 per prescription may be too high, and 5.22 and $28.71 are too low. New estimates are made of $5.07, 5.87, and $29.77. (Since these calculations were performed, the Green Shield (1975) *Annual Report of Prescription Services Incorporated* has been released and reports an average prescription price of $4.99). Total estimated program costs for prescriptions are then $245.2 million.

VI (p. 41) As an estimate of the impact of 'very high' rates of utilization increase (10 per cent *per capita* per year from 1973 to 1975), the implied use levels were calculated at 6.78 prescriptions per year and $283.1 million program costs.

VII (pp. 41-2) Administrative costs for the program are estimated, again from various data sources, to be about 10¢ to 20¢ per prescription reimbursed. On an estimate of 20¢, total program costs rise to $245.2 + $9.7 = $254.9 million.

VIII (pp. 42-3) An attempt is made to specify a reasonable range of utilization responses to the introduction of insurance. A range of 10% to 25% is chosen, implying total program costs of $280.4–$318.6 million for 1975.

One cannot immediately break these estimates down into prescription prices and *per capita* utilization rates, because they are based on sales data from a range of different types of retail outlets. Surveys conducted annually by the Canadian Pharmaceutical Association yield numbers and average prices of prescriptions sold by pharmacies alone (or at least by the responding subset) and various public and private drug insurance programs generate data for their membership groups. Fuller (1975) reports an average prescription price for Canada in 1974 of $4.45 (pharmacists only); Green Shield Prescription Services Inc. in Ontario reports a very similar $4.41, while the Regie de l'Assurance-Maladie du Quebec paid $4.53 per prescription for its social aid recipients and $4.31 per prescription for recipients of the maximum monthly income supplement.

In 1975, however, these numbers may have moved up significantly. British Columbia's pharmacare plan for the over-65 showed a rise in average prescription price from $4.75 in August 1974 to $5.38 in April, 1975; projecting this would yield an August price of $5.61 or a mid-year average of $5.50. Ontario Blue Cross was also paying in the neighbourhood of $5.50 in mid-1975. Combining these with an estimate of total *per capita* spending of $28.71 (derived above by assuming two years of 10 per cent increases on the 1973 base) would imply $28.71/$5.50 = 5.22 prescriptions *per capita* or 5.22 X 8.237 = 43.0 million prescriptions in Ontario in 1975.

Of course, partial-coverage insurance programs yield utilization and cost per beneficiary data as well. The estimates above are based on the assumption that the unrepresentative nature of such plans, and/or their effects on the net price paid by beneficiaries, will have more serious distorting effects on patterns of utilization than on prices per prescription. Thus Green Shield reports 6.43 prescriptions per insured in 1974, rising steadily since 1969, and costs of $28.36. The Quebec Regie reports 10.1 and 12.2 prescriptions per beneficiary and costs of $45.73 and $52.45 in its two drug insurance programs, covering nearly 600,000 people in 1974. These make 5.22 look a bit low. Still, given the wide variation by age in utilization of prescription drugs, differences in the age composition of the insured population can have a major influence on patterns of utilization. In general one would expect the bias to be upward, as public plans tend to target high-use groups (the elderly and chronically ill) while private plans are likely to experience self-selection, and both may experience increased utilization due to the reduction in net price to the consumer. Biases in prices paid are less clear – they may be higher due to reduced price-shopping incentives, or because chronic care prescriptions are larger. The US Task Force reports (*The Drug Users*, 1968) that the elderly have more costly prescriptions. On the other hand, the shift to fixed fee billing by pharmacists has the effect of reducing the dispersion of prescription prices. A rough check on the 5.22

estimate may be derived by noting that the C.PH.A. Survey (1973) reports 91,274,080 prescriptions filled by Canadian pharmacies in 1972, or 4.18 *per capita*. It also reports prescription sales of $387.9 million, or 86.65 per cent of the NHW estimate for 1972 of $447.7 million by pharmacies and other retail outlets. Blowing the 4.18 up, 4.18/0.8665 = 4.82 prescriptions *per capita* in 1972. This is for all of Canada; the corresponding Ontario estimate could be derived by noting that the C.PH.A. survey estimates prescription prices in Ontario in 1972 as $4.20 and NHW reports *per capita* expenditures as $21.90 yielding an estimate of 5.21 prescriptions *per capita*. Since there is a general upward trend in utilization of drugs (the US Task Force quotes 2-3 per cent per year, 'long run,' and recent Canadian data show even higher rates), 5.22 thus appears too low for Ontario in 1975. At 2 per cent growth per year utilization would be at 5.53 by 1975. This requires either that the $5.50 per prescription is too high, or that the estimate of 10 per cent per annum growth in costs *per capita* is too low. It should be noted that the C.PH.A. surveys at the provincial level are relatively small samples, and an error of a few cents on average prescription prices could move these estimates substantially.

Nevertheless, given Fuller's (1975) report that prescriptions filled in pharmacies in Ontario rose 14.9 per cent from 1973 to 1974, a 2 per cent *per capita* annual growth rate for all prescriptions from 1972 to 1975 does seem excessively conservative. Taking all these forces into consideration, it would appear that $5.50 per prescription may be too high for the whole population, and 5.22 prescriptions and $28.71 *per capita* are both too low. Adjusting the former, BC Pharmacare and Ontario Blue Cross experience suggests that the increase in prescription prices from 1974 to 1975 was somewhere between 12 per cent and 16 per cent. If we took the mid-range of this, 14 per cent, and applied it to Fuller's (1975) estimate for all Canada of $4.45 per prescription, then assuming that Ontario and Canada prices were not significantly different, we would get a substantially lower estimate of $5.07 per prescription for all of Ontario, 1975. If we assume 12 per cent annual increases in *per capita* expense from 1973 to 1975, this implies $29.77/$5.07 = 5.87 prescriptions *per capita*. This compares reasonably well with the results from combining Fuller's 1973 price estimate ($4.24) with NHW Ontario expenditure *per capita* ($23.73) to yield 5.60 prescriptions *per capita* in 1973. An increase from 5.60 in 1973 to 5.87 in 1975, or 4.8 per cent, is about equal to the long-run trend. Total prescriptions filled in 1975 would then be 5.87 × 8.237 = 48.4 million, and total program costs $29.77 × 8.237 = $245.2 million. (This estimate assumes that costs per prescription will not rise in response to the plan. For example, as noted in chapter 3 below, international manufacturers might reasonably respond by raising ingredient prices to Canadian subsidiaries.)

These estimates still look a bit conservative relative to Fuller's 1974 over 1973 jump of 14.9 per cent in utilization, of which only about 13 per cent would be utilization *per capita*. It is possible that his sampled pharmacies are increasing their share of the prescription market. On the other hand, if in fact utilization were rising by as fast as, say, 10 per cent per year from 1973 to 1975, we would get an estimate of prescriptions *per capita* of $5.60 \times (1.10)^2 = 6.78$, for costs *per capita* of $6.78 \times \$5.07 = \$34.37$, total prescriptions of 55.8 million and program expenses of $283.1 million. This probably represents a high side estimate.

This leads into the murky question of administration costs, which tend to be estimated on a per prescription basis. Wertheimer (1972) surveys a range of estimates of administration costs, making the important points that (1) public plans tend not to account for the full range of administrative services used, so underestimating costs; (2) insofar as compliance costs (i.e. record-keeping, billing, or other specific costs of participation) are imposed on the participating pharmacist, they will re-emerge as higher dispensing fees; (3) utilization control is a large part of administration, so that a tight plan may spend more per prescription to hold down waste and fraud or a loose one may be very cheap to run but relatively costly in total; (4) since drug claims are small and numerous, compared to, e.g., hospital claims, a high administrative charge can eliminate the risk-reducing benefits of the insurance/prepayment mechanism. Wertheimer observes administrative cost estimates running from 13 cents to over a dollar per prescription, and quotes private contractor prices of 40 cents. He also notes a 'maximally efficient' 20 cent estimate of Rucker, and this 20 cent figure also emerges in the US Task Force Final Report (1968). No clear relation is set up between cost estimates and degree of tightness of administration. Little Canadian evidence is published; but after adjusting for non-charged services such as overhead and computing, a range of 10 cents to 20 cents seems not too high. Such costs, however, rely on passing compliance costs to the pharmacist and could conceivably be a factor in recent prescription price moves. Moreover, such low prices buy little or no administrative control and utilization rates are said to be causing concern in Ontario and British Columbia. Green Shield, by contrast, reports administrative costs at about 65 cents per prescription from 1970 to 1973 with a small drop in 1971 and a jump to 87 cents in 1974. This probably reflects marketing costs, however, perhaps also development costs for new dental and eye care insurance packages in 1974. Nevertheless, the discrepancy is striking.

Using the lower figures, of 10 cents-20 cents per prescription, on an estimate of 48.4 million prescriptions in 1975, total administration costs would have been $4.8-$9.7 million. On the other hand, the Green Shield 65 cent rate leads to

$31.5 million. Clearly there is room for a wide range of estimates. However, since a universal public plan in Ontario would enjoy substantial scale economics (being about 80 times the 1974 Green Shield enrolment) a more conservative estimate seems appropriate. At 20 cents per prescription, a $9.7 million administrative charge (of which only about half would actually show up as program costs, due to the nature of government budgeting) does not seem unreasonable.[5] This leads to an estimate of total 1975 costs for a hypothetical universal drug insurance plan in Ontario of $9.7 + $245.2 = $254.9 million – *if* there were no utilization or price response. The if is very large. On the other hand, if utilization patterns have in fact begun to climb at unusually high rates since 1973, the cost would be in the range of $290-$300 million.

Part of the potential discrepancy arises because of an ambiguity over the handling of the impact of insurance. This procedure has attempted to measure the cost of such a plan if there were no utilization effects, and has therefore been able to disregard the existence and spread of partial-coverage plans from 1973 to 1975. In fact, however, there may be effects on utilization from such plans; and insofar as recent utilization trends reflect the effects of introducing such plans, they may be moving upward at unusually high rates. Conceptually, therefore, it may be preferable to think of the estimates of $\simeq$ 50 million prescriptions and $\simeq$ $255 million as what Ontarians would have spent on prescription drugs in 1975 if there were no drug insurance plans functioning.

Allowing for the response of utilization to a universal, first-dollar insurance plan is rendered difficult by the wide range of estimates available in the literature for the price elasticity of demand for prescription drugs. The range runs from the assumed zero price elasticity used by Walker (1971) in his study of drug manufacturing, to the recent estimates by Newhouse (1976) that utilization would rise by 90-130 per cent under a universal plan. Cady (1976) on the other hand reports demand elasticities of –0.29 to –0.41 which were statistically insignificant and hence 'may be very close to zero.' The US Task Force (1968) assumed that an insurance program which was moderately effective would raise utilization by 7 per cent (Final Report Ch.9) but later (appendix A) refers to 20-25 per cent increases in hospital use after hospital insurance and 'the increase in drug utilization should be substantially more.' Low and high estimates of 25 per cent and 40 per cent are used, leading into involved calculations as to the impact of various different coinsurance and deductible features.[6]

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[5] Government budgets generally report only direct costs of administration – manpower and supplies. Overhead costs such as space and space maintenance, donated services such as computing facilities and general administration, costs of fixed and working capital, which would all be included in the rate charged by a private firm, are frequently ignored. These are nonetheless real resource costs, and will show up (not separately identified) in some other budget item.

This problem arises in all analyses of the health care industry, due to the inconsistency between the institutional realities of health care and the theoretical underpinnings of economic demand analysis. The relation between alternative economic and non-economic models has been examined by Stoddart (1975). The conventional economic model treats utilization as the result of individual informed demand choices, resulting from the confrontation of consumer preferences with market prices. It attempts to analyse health care behaviour while ignoring the role of the professional provider. This effort may proceed either by pretending that the professional does not exist, or more subtly by assuming a 'complete agency' relation in which the professional makes decisions with total information about the patient's preferences and everything else, and attempts to maximize the patient's welfare as judged by the patient. This is of course neither descriptively accurate, nor economically rational, nor even theoretically possible from the professional's point of view. A recent paper by Tuohy and Wolfson (1976) dissects the agency model in some detail, tracing the various conflicts of interest and information gaps which render the complete agency model uninteresting.

On the other hand, the medico-technical model which assumes that physicians prescribe and patients consume drugs quite independently of their market prices is also an over-simplication of reality. Most obviously, 'compliance' may relate to price. A certain proportion of prescriptions written will not be filled. The physician's willingness to prescribe, and the patient's desire for a prescription, may both depend on prices. Greenlick and Darsky (1968) found a clear pattern that physicians who were more likely to be subject to pressures from patient preferences also prescribed more drugs to an insured group. Even the willingness to see a physician may depend on drug prices, particularly if medical care is already insured. Given the symbolic role prescribing plays in the physician-patient relationship, its substitution for the expenditure of high-priced physician time as a gesture of understanding and taking charge of a patient's problem, the prospective patient may anticipate that a visit is very likely to give rise to a drug. The price of the drug becomes part of the price of a visit.

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[6] This issue is of course related to aggregate or market-wide elasticities. Any individual drug retailer may face a price-elastic demand because market shares respond to relative prices, even if the total demand for drugs were entirely price insensitive. See chapter six below.

To the above fuzzy but none-the-less real effects, one can add substitution effects as well. For many conditions, particularly upper respiratory problems, low grade pain, or sleeplessness, prescription and non-prescription (over-the-counter, or 'OTC') medications may be close substitutes. Hence an apparent 'demand elasticity' for prescription drugs may include a cross-elasticity as prescriptions are written to cover conditions which in an uninsured world would have been treated by OTCs. Total drug use may not rise but the proportion prescribed and insured does. The same effect could arise in a partial plan if insured patients acquire drugs for the uninsured; again no allocative change has occurred but a transfer of costs is possible which as in the OTC case creates an apparent increase in utilization. Thus one may conclude that utilization levels have the potential to be a significant problem under any insurance plan.[7]

Such effects may be showing up; Quebec reports a 23.2 per cent jump in prescriptions per beneficiary, from 8.2 in 1973 to 10.1 in 1974. However, the Regie points out that this is partly due to changes in the age and sex mix of beneficiaries, and does not represent a pure utilization increase. A sampling of four separate months of data from the BC pharmacare plan, from August 1974 to April 1975, yielded annualized rates per month of 9.2, 17,8, 14.4, and 17.0 *per capita*. Keeping in mind that a population age 65 and over would be expected to use two-and-a-half to three times as many prescriptions as the general population, these data suggest that estimated increases of the order of magnitude of 100 per cent can safely be ignored.[8] The US Task Force (1968) assumed that with no utilization review, prescriptions *per capita* for an aged population would rise by 14.3 per cent, from 14.0 to 16.0 *per capita*, but that 'moderate,' 'effective,' and 'very effective' utilization review could reduce these increases to 7.1 per cent, zero, and −10.7 per cent respectively. This opens up the important consideration that existing, uninsured levels may represent 'overuse' from a therapeutic standpoint, so that an optimal insurance program might well lower drug use by non-price mechanisms even though prices to the consumer fell to zero, an issue which requires further treatment below.

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[7] This does not, of course, justify the knee-jerk reaction of conventional economics that coinsurance or other forms of patient involvement in payment are the best, or even useful, ways of controlling utilization. In health care, utilization is generally a supply-side as much as a demand-side phenomenon and its control requires policies recognizing this fact. Utilization is not demand, and willingness to pay has no necessary relation to therapeutic value. Conventional economic analysis, which via the consumer sovereignty postulate equates individual willingness to pay with social benefits, is conceptually unable to distinguish the dispenser of penicillin from the snake-oil salesman. One may accept the existence of *certain* parallels, but analytic identity is absurd.

[8] There is a puzzling tendency on the part of some investigators to generalize point elasticity estimates from 'demand curves,' which are themselves mis-identified due to being based on utilization data, into predictions of exceptionally large 'demand responses' to health insurance programs. The consistent refusal of utilization to double or triple in actual public insurance programs must then be explained away on other grounds, such as non-price rationing. It is curious that utilization can be assumed to represent a point on some hypothetical demand curve when insurance is absent, but not when it is present. The root of the problem, of course, is that in the health care industry a demand curve in the conventional sense does not exist in either case – see Stoddart (1975).

It does not, however, give much guidance on the general question of what specific numerical estimates should be given for the impact of full insurance on utilization. Instead, it suggests that the answer depends critically on the structure of the plan and that there is not yet very much generalizable experience from which to develop estimates. What experience there is, from public insurance plans, is based on special populations whose elasticity of response is likely to be different from that of the general population. An estimate of increases in utilization in the range 10-25 per cent, however, seems to be relatively conservative on the basis of the existing literature. It chops out the zero estimates at one end, and the almost 100 per cent increases found by Greenlick and Darsky for PSI (1968) or the 90-130 per cent forecast by Newhouse (1976). It must be stressed, however, that these estimates are for purposes of calculation only and that levels and particularly patterns of utilization are themselves policy objectives or targets. The manipulation of prices paid by the consumer through insurance coverage may be one possible instrument for achieving this target, but not the only one nor even necessarily the best.

Adding in an assumed rate of utilization increase of 10-25 per cent, therefore, one arrives at an estimated cost for a universal, first-dollar drug insurance plan for Ontario in 1975 of \$254.9 million × (1.1-1.25) = \$280.4-\$318.6. As noted above, preliminary data suggest that utilization behaviour may have moved up at above trend rates in 1974 and 1975, but on the other hand by 1975 a substantial degree of public and private insurance was already in place. This was particularly true if the proportion of population insured is weighted by expected consumption, as the elderly insured under pharmacare use several times as many prescriptions per year as the younger aged groups. On balance, then, a total package cost of \$300 million in 1975 seems plausible. There are obviously ways in which this estimate could be refined – it will indeed refine itself as more up-to-date data become available – but it will serve as a working estimate at this stage and the interested user can easily modify it by inserting alternative component estimates.[9]

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[9] For example, suppose one assumed that the utilization increase resulting from full insurance coverage were 25 per cent. In 1975 the over-65 population in Ontario was insured. Nothing that this group makes up about 10 per cent of the population but uses about

IS UNIVERSAL OPTIMAL? SCALING DOWN THE PACKAGE

It is notable that, in contrast to the introduction of hospital and medical insurance, provincial governments have tended to introduce pharmacare on a partial rather than a universal basis and to target for assistance specific subgroups of the population – the elderly, the chronically ill, the poor – rather than moving to a universal plan in the first instance. In part this may result from nothing more sophisticated than a response to fiscal constraints and an allocation of scarce resources to the 'most needy' first. But in terms of the criteria or objectives for public insurance set out in chapter one, there are good reasons why a universal plan may indeed be a very inefficient use of social resources, and why a partial-coverage plan on the demand side combined with a modified form of social intervention in supply may be preferable for all (or almost all) concerned. Indeed, the two provinces (three, by 1977) so far to have 'gone universal' have done so in ways which depart significantly from the universal, first-dollar hospital and medicare model and which seem to be fundamentally rational rather than simply short-run expedients. It would be a serious mistake to assume that the long run goal 'ought' to be 'free' drugs for everyone.

Assuming that a universal, first-dollar drug insurance plan for Ontario would in fact cost about $300 million in 1975, what does such a plan buy? The obvious answer – drugs – is incomplete, drugs will be bought with or without a plan. As developed in chapter one, we assume that a public insurance plan 'buys,' for the citizens of the province, a variety of different classes of effects which may be intended or unintended. The program 'buys' financial effects, in that it both reduces the financial uncertainty faced by potential drug users and transfers wealth from non-users to users. Moreover it may lead to changes in drug utilization levels and patterns, and thereby to changes in population health levels, although the linkage is far from certain. Finally a universal insurance program, by removing completely any sensitivity of patients to relative prescription prices, may change the economic behaviour of pharmaceutical dispensers and thereby affect the structure and efficiency of that industry. In return for these changes, we can assume that a drug insurance plan, pure and simple, without intervention on the supply side to modify utilization or dispensing

three times as many drugs *per capita*, one would anticipate an increase of 25 per cent with respect to 30 per cent of drug consumption or 7.5 per cent. Adding this on to a 12 per cent annual increase from 1973 to 1975 would increase cost estimates from $254.9 million to $274.0 million in 1975 – but would correspondingly reduce the effective increase to be expected from further extensions of coverage. When the actual expenditure data for Ontario in 1975 emerge, they will of course be a blend of insured and uninsured costs.

patterns, *must* lead to a higher cost for drugs in total. This will result from administrative costs and from increase in utilization. Public (or private) insurance never makes drugs 'free' – instead it makes them more expensive. This must be balanced against the above advantages.

RISK SPREADING

In the case of universal pharmaceutical insurance, however, these advantages turn out to be pretty tenuous. To begin with risk reduction, the point made in chapter one must be reiterated that risk is an *a priori*, not an *a posteriori* concept. It may well be true that drug use is very unevenly distributed among the population. So is everything else. The fact, if it were a fact, that 10 per cent of the people use 50 per cent of the prescriptions, would not make prescription use an insurable event if those 10 per cent be identified in advance of that use. To take an extreme case, if drug use were exactly correlated with and determined by age, we might observe very large differences in the level of drug expenditures incurred by different members of the population, but risk would be entirely absent because each individual's level of use and expenditure would be entirely predictable from his/her age. We might still advocate a public 'insurance' program to redistribute this burden in a more socially acceptable manner; but it would be deceptive (and possibly deliberately so) to refer to such a program as insurance in the sense of risk spreading as there would be no risk to spread! If expenditure is known in advance, be it never so variable across people, there can be no uncertainty and no benefit from the reduction of uncertainty.

Now, of course, drug expense is not known with certainty. But it is much closer to this end of the spectrum, for most of the population, than is, say, hospital use. While it is true that the expectation of hospitalization is much higher for the elderly, nevertheless any member of the population is exposed to some non-trivial risk of accident or acute disease that might require hospitalization. And *any* episode of hospital use is economically significant. Hence there are genuine benefits in the risk reduction associated with hospital insurance which can be set off against the certainty that for the average individual costs will be higher under insurance (though mostly buried in taxes).[10] In the case of drug expenses, however, this appears not to be true. Except for the elderly and the chronically ill, most people spend relatively little on drugs and their expenditure has low variance.[11] This is particularly evident in Josie (1973) reporting the Canadian findings of the WHO-ICS-MCU international study. Both utilization and particularly variance of utilization are low up to age 45, and climb rapidly thereafter. The same pattern is reported in the US Task Force (*The Drug Users*, 1968); risk of very high *per capita* drug expense is almost entirely a problem of the aged. The identification of 'the aged' is not unambiguous – almost everyone would agree that this includes those aged 65 and over. But for the group aged 45-64 reported results vary. Quebec data show this group using *more* drugs than the 65+, and Greenlick and Darsky (1968) also show utilization in this group as high as in the 65+ group. Such a pattern is absent from the Josie and Task Force data, however, and suggests strong self-selection forces at work. The Quebec data should be especially vulnerable to the correlation between illness and income, as forced retirement due to illness in the pre-65 years would place persons not yet eligible for national pension plans onto the social assistance rolls. On the other hand Andersen *et al.* (1973) show persons in their sample aged 55-64 with total annual prescription drug expense of $64, rising to $68 for the 65-plus group, compared to $32 for the whole group. These are 1970 data, and are high relative to the Canada data showing 1970 *per capita* expenditures of $17.90. But they suggest that 'the aged' for drug utilization purposes may be those over 55, not merely over 65.

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[10] *Assuming* no supply-side administrative intervention. An effective public regulatory program combined with public insurance could certainly lower costs. At one time also there was some hope that insurance, by lowering barriers to care, would lead to earlier, more effective, and cheaper care. Ah well ...

One may then conclude that as a risk-spreading device, universal pharmaceutical insurance has little to recommend it. For most of the population it is a somewhat more administratively complex way of pre-paying small and predictable bills – rather like a credit card plan. This is not an argument against a universal plan, but it is not a positive argument either. A partial plan such as those now in existence in several Canadian provinces makes more sense by serving those who are in fact exposed to the risk of large expenditures, although even for the elderly group we do not know that the relatively large variance in annual expenditure represents a high level of *a priori* risk or simply a greater incidence of chronic conditions.

WEALTH TRANSFER

This leads to the second justification of an 'insurance' plan, particularly 'social insurance,' that it serves as a mechanism for redistributing wealth. A universal drug insurance plan will redistribute wealth from taxpayers to drug users. If the latter tend to be relatively more ill, older, and poorer, we may count this transfer as a significant benefit of a universal plan. It is certainly true that drug use is concentrated more heavily among the old. A striking finding of the WHO-ICS-MCU study (see Rabin and Bush, 1976) is that it is quite significant among the healthy as well as the ill, and that it does not appear to be very sensitive to socio-economic class. Healthy people do, however, use drugs significantly less frequently than mildly, acutely, or chronically ill people; and if low-income people use drugs as frequently as high-income people then they spend a higher proportion of their income on drugs. On balance, then, the transfer effects of a plan are in the direction usually considered desirable from a social standpoint. Like the risk-reduction effects, however, most of the transfer benefits are concentrated on a relatively small proportion of the population identified as high users by reason of age or ill health. For the majority of the population, the process of 'insurance' would consist of taking away small sums in taxes and giving back even smaller sums in benefits with the corresponding generation of considerable waste motion.[12] A tax-financed partial plan has almost all the distributional benefits of a universal one, at a substantially lower level of operation (and administrative expense).

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[11] Any acute illness episode which leads to hospitalization may generate an associated need for drugs, but these are included under the hospitalization insurance program.

UTILIZATION PATTERNS AND INDUSTRY EFFICIENCY

The impacts of a universal plan on the last two criteria, utilization patterns and industry efficiency, seem unambiguously negative. The second point is particularly clear; insofar as consumer sensitivity to prices currently imposes any competitive restraints on drug pricing behaviour at either the manufacturing or the retail level, insurance would eliminate that constraint. At present the role of competition as a regulator of retailing efficiency or a limitation on the pricing strategy of manufacturers has been severely attenuated by professional restrictions and by the spread of partial insurance plans. The best one could say of universal insurance is that competition may already have been so emasculated by collusive supplier behaviour that universal insurance could do no further damage to the efficiency of the industry. This argument really takes us into the supply side of the analysis, which will be dealt with below. In general, regardless of whether there is any effective degree of competition in the pharmaceutical industry at present (the evidence is mixed) a universal insurance plan would stifle any efforts to improve the efficiency of the industry and thus eliminate the benefits from several supply-side policies whose potential benefits are quite significant. Universal insurance tends to freeze the present delivery system, and that could be very costly.

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[12] There are still *some* redistributional benefits, insofar as drug expenditures for the average non-elderly, non-chronically ill do not appear to vary much by income class. Hence a tax-financed plan would convert an expenditure which is currently a higher proportion of lower income budgets (regressive) into one which is proportional or progressive (depending on the marginal tax incidence). But the amounts involved are singularly unimpressive.

As for utilization effects, the traditional professional justification for health insurance has always been the removal of financial barriers to access, with the implication that any increase in utilization would be in conformity with professional directives and therefore contribute positively to health. While rooted in different assumptions, traditional economics yields the same conclusion. If people choose to use more drugs they must derive utility from such use and (by consumer sovereignty) such use contributes to social welfare. More drugs are better.

In light of growing professional concern about over-medication on a massive scale, combined with a shift in economic analysis away from the easy equation of utilization with social benefit, both these positions are becoming increasingly dubious. Rabin and Bush (1976) express surprise over the extent of drug use by the healthy, and point out that increased use implies both increased risk of adverse reaction and of harmful drug interaction. Silverman and Lee (1974) suggest in rough figures that adverse reactions may involve costs (in the US) as high as $4.5 billion for hospital charges alone – in 1971 they estimated $3.0 billion, compared with direct prescription drug costs of $10.0 billion. Chaiton *et al.* (1976) studying patterns of medical drug use in two Ontario communities, in the context of related literature, refer to present drug use patterns as 'galloping consumption,' and conclude that 'The pattern and appropriateness of physicians' prescribing practices justify concern that iatrogenic drug abuse may be emerging as a socially significant phenomenon.' They note that the introduction of a nurse practitioner in a general medical practice brought about a significant reduction in use of prescribed tranquilizers and sedatives.

Now of course zero adverse reactions can be achieved only with zero drug use – a trade-off between benefit and reaction is always necessary. But the judgment of informed observers seems to be swinging to the position that at present the institutionalized forces promoting over-use are stronger than the counter-pressures. The general problem is that the volume of information necessary for a prescriber to make informed drug choices has now become so large and is so contaminated with noise (some deliberately induced), that the health as well as economic costs of drug use are systematically understated and underperceived. The patient, of course, has no hope of making such choices. On the other hand, the economic pressures toward over-use at the manufacturing, prescribing, and dispensing levels are abundantly clear (see, e.g., Walker, 1971; Torrance, 1972; Silverman and Lee, 1974, but by no means exclusively). In this environment it seems doubtful that one can assign a positive health payoff to yet further increases in the use of prescription drugs, unadjusted for appropriateness. It is worth noting that Becker *et al.* (1972) and Stolley *et al.* (1972) found for a sample of US physicians that the externally evaluated appropriateness of prescribing behaviour was *negatively* related to frequency of prescriptions per visit. And if the payoff is not health, what is it? Do we attach a benefit to increasing drug use which makes people sicker, but more satisfied because they believe themselves better off? If so, what justification is there for suppressing the snake oil salesman or the heroin pusher?

We are thus led to the view that the case for a universal pharmacare program is not very good. Its positive risk-spreading and wealth transfer benefits are confined to a subset of the population and can be achieved with a much more limited program such as the one already in effect in Ontario for the aged. Its tendency to increase utilization of prescribed drugs is as likely to damage as to improve the average level of health of the population. And the total insulation of the drug delivery system from competitive price effects which would result from first-dollar, full coverage would not only eliminate what few efficiency pressures now exist, it would undercut promising future strategies to use enhanced competition as a way both of generating information about the true costs of drug delivery and of creating incentives for more efficient delivery. These considerations suggest that a universal full coverage insurance-type plan is not a desirable long-run goal.

As indicated in chapter three, a program of 'free drugs' within the framework of a more general restructuring of the whole health care delivery system is another issue. Separation of professional and entrepreneurial roles in both prescribing and dispensing, creation of a genuine 'therapeutic team,' and establishment of effective public controls over over-use and misuse of drugs might mitigate this conclusion somewhat. Such a general reconstruction of health care delivery would be a much more ambitious project than the present study; but without such a restructuring, 'half a loaf,' in the form of demand-side intervention only, is worse than none. Whatever system is adopted, however, the problem of how to improve the operating efficiency of the dispensing process would remain. For this purpose the superiority of direct controls over market forces has yet to be demonstrated.

There are of course a wide variety of different ways in which one can scale down a full coverage, universal plan. In general the dimensions of variation are three: population insured, proportion of bills reimbursed, or type of pharmaceutical to be reimbursed. Thus, for example, one can provide reimbursement for those over 65, or recipients of social assistance, or identified as suffering from particularly expensive chronic diseases. One could restrict reimbursement to a fixed percentage of total bills (coinsurance) or require a deductible of \$$X$ total expenditure per annum before reimbursement is applied, or impose a flat charge of \$$Y$ per prescription. Or one could restrict reimbursement to a particular class of drugs, such as those prescribed for chronic or expensive conditions.

Although administratively different, however, these modes of restriction share common objectives and have overlapping effects. These objectives can be interpreted in terms of the four basic criteria of chapter one. Thus one major objective might be to limit the program to the subgroups of the population who actually were exposed to risk of high drug expenses, and/or were considered appropriate recipients of wealth transfers. One obvious way of achieving this result is to use an annual deductible, set somewhat above the average level of *per capita* drug expenditure, and to pay 100 per cent of all insurance claims above that level. Such a plan automatically eliminates the risk of heavy expenses for all citizens, and transfers wealth to those who are relatively heavy users of pharmaceuticals. The average citizen is effectively uninsured for all his pharmaceutical purchases, but since the average citizen spends a relatively small and predictable amount on drugs, this is as it should be. He/she benefits by elimination of any risk of very high expenses, but since that risk is minute for the non-elderly, so also is the benefit. A deductible plan, like an age-qualification, is thus a mode of restricting the actual beneficiaries to the high-risk, high-use groups. It has all the risk-reduction benefits of a universal plan, and its wealth transfer effects are positive insofar as use of drugs is negatively or non-correlated with income and taxpaying is positively correlated.

The choice between deductibles, age qualification, and specific drug coverage as means of subdividing the population depends on reliability of the correlation of the latter two measures with heavy drug use. Relative to a deductible, an over-65 plan benefits the healthy elderly who use an average number of drugs, as well as conferring a flat \$$X$ benefit (equal to the deductible) on all the elderly who are heavy drug users. On the other hand all those under 65 remain exposed to risk, and those few who actually are heavy drug users will lose. The over 65 plan thus has weaker benefits in terms of risk-reduction, and a wealth transfer effect which is geared to age as well as drug use. Whether heavy drug users *per se* or the elderly *per se* are more deserving of transfer benefits is obviously a value judgement going beyond pharmaceutical insurance, but it must be noted that the beneficiaries of an over-65 plan include relatively healthy, upper-income people while high-drug-using, low-income people will be excluded. This does not occur with a deductible plan.

The third alternative, restriction of types of drug covered, can subdivide the population successfully only if drugs are in fact separable into high-use and low-use categories. Ideally one would require that high-volume and low-volume drug users receive distinctly different and non-substitutable prescriptions. Insofar as this therapeutic separation breaks down in practice, some of the population with high expenses will be unprotected and/or low users will be subsidized. One can also expect substitution of drugs on the covered list for uncovered where possible, and very heavy pressure to have the covered list expanded. These effects suggest that the restricted list is an obvious way to discourage the prescribing of certain drugs or to affect manufacturers' pricing policies; but as a device for subdividing the population and targeting high-risk, high-expense groups the deductible or age-based plans would appear to be superior alternatives.

Discouraging the use of certain drugs (e.g., combinations, drugs with dangerous side effects, or merely ineffectual drugs) is a component of the third objective, influencing patterns of drug utilization. The whole coinsurance literature, which consumes so much attention and energy in the US discussions of health insurance, is focused on the putative impact of insurance on *aggregate* utilization and the potential use of charges to the patient to mitigate these effects. In this context, it is important to note that the role of point-of-service charges in influencing supply-side behaviour is at least in principle as important as their effect on the demand side. (Whether the prescribing process is supply-side or demand-side is a bit ambiguous, though clearly prescribing is part of the drug delivery system.) A flat $X charge per prescription, however, which is independent of the type of prescription written or the choice of dispensing location, removes any possibility of supply-side impact and serves merely as an aggregate utilization control. The requirement that the patient pay a percentage of drug charges still leaves open some possibility of supply-side impact, as a proportion of the cost of both prescription ingredients and dispensing is passed through to the consumer. Both types of charge, however, seem powerless to deal with the problem perceived at present, that drug use is already too high and the pattern of use is therapeutically inappropriate. Insofar as drug insurance may exacerbate this problem, its effects will be less severe if some form of point-of-service charge is maintained. But the risk-spreading and wealth transfer benefits of insurance will correspondingly be reduced. The more important use of point-of-service charges, as will be suggested below, may be as a tool for rationalizing the supply side. The whole *raison d'être* of the prescribing function of the physician is a social judgment that consumer/patients are inadequately informed to make their own utilization decisions – attempting to modify those decisions by incentives aimed at the consumer would seem inconsistent, to say the least.

Alternative partial insurance plans have also been suggested as ways of mitigating the damaging effects of full insurance on the incentive structure of the drug delivery system, in that, for example, an over-65 plan could include the requirement that drugs supplied to the insured be priced the same as those supplied to the uninsured. Such competitive forces as exist in the uninsured market would then help to constrain suppliers in the insured market as well. Or point-of-service charges of Y per cent of the prescription would ensure that the patient remained responsive to differences in dispensing prices. In principle, it is certainly plausible that a partial plan would have a less severe impact on pricing behaviour than a full plan. But the strength of competitive forces at any level of drug delivery has never been impressive even in the absence of insurance, and some form of price regulation or negotiation seems unavoidable under any program, so the advantages of partial plans over full plans may be rather tenuous. For what it is worth, however, a deductible plan seems to have the advantage in that all of the population is exposed to full market prices for some drug purchases, and most of the population for all drug purchases. Such competitive forces as are at work will thus be attenuated only for heavy drug users (who may be less price responsive if old, ill, and immobile, or more so if chronically ill and able to plan large purchases well in advance – on balance we do not know which) and even they will be required to take note of prices for part of each year. An over-65 plan eliminates price effects completely for a relatively high-using segment of the population, and coinsurance plans dilute price effects for everyone. *A priori* one would thus expect price-searching behaviour by consumers and competitive behaviour by suppliers, such as it is, to hold up best under a deductible plan.

Compared with a full-coverage, first-dollar plan, a partial plan should of course be significantly cheaper. One could cost out an over-65 plan, for example, by observing the number of people in the population aged 65 or over, estimating the relative level of utilization of drugs by this population, and adjusting for the fact that their prescriptions seem to be more costly on average. Estimates of relative utilization vary; Josie (1973) reports that the average number of prescribed medicines taken in a two-day period per thousand population was from 2.1 to 2.7 times higher for the over-65 group than for the average of the population. Mueller and Gibson (1975) report US expenditure data showing *per capita* expenditures to be 2.3 times the average for 'drugs and drug sundries' but this includes non-prescription medicines which Josie reports to be used only 1.6-1.9 times as frequently by the aged. Andersen and Anderson (1967) report expenditure rates *per capita* of 2.7 times the average for the over-65 population, and the US Task Force (*The Drug Users*, 1968) shows a ratio of 2.42 in prescription use (11.4 against 4.7). Since these studies come from a number of different places and time periods, the absolute numbers are not too helpful but the ratios are significant. Any particular ratio, however, will be very sensitive to the mix of the 'average' population used as a base. Thus Greenlick and Darsky (1964) comparing over- and under-65 insured groups find a lower ratio, as does the Regie de l'Assurance-Maladie du Quebec. In both cases, however, utilization in the 45-64 group is exceptionally high presumably due to self-selection.

As noted above, average prescription prices for insured groups, and particularly for the aged, seem to be somewhat higher than for the general population. In costing out a universal 1975 plan in Ontario an estimated average prescription price of $5.07 was used compared with estimates of $5.50 from insurance plan sources. This difference of 8.5 per cent compares with an estimated difference of 11.1 per cent in average prescription prices for the elderly and non-elderly reported by the US Task Force (*The Drug Users*, 1968). If we average these to an assumed 10 per cent rate, then a difference of 2.7 times in average cost *per capita* is consistent with a 2.45 ratio of acquisitions – consistent with the Josie and Task Force estimates. Pulling these together, then, we may estimate that the Ontario population over 65 constitutes 8.6 per cent of the population (by extrapolation from Government of Ontario, *Ontario Statistics 1975*), but would use 2.45 X 8.6 per cent = 21.1 per cent of the prescriptions, and account for 2.7 X 8.6 per cent = 23.2 per cent of the prescription expense. Using the estimates of 48.4 million prescriptions and $254.9 million for a universal plan, one then derives benchmark estimates for an over-65 plan of 10.2 million prescriptions and expenditures of ($245.9 X 0.232) + ($0.2 X 10.2) = $59.1 million for drug costs and administrative expenses. Allowing for a 10-25 per cent range of utilization response, these become 11.2-12.8 million prescriptions and $65.0-$73.9 million. In *per capita* terms, this would imply that the over-65 population would be using an average of 5.87 X 2.45 = 14.38 prescriptions each, adjusted for utilization effects of 10-25 per cent to 15.82-17.98, or about 16-18 prescriptions each per year at a cost of about $5.58 each, total *per capita* cost of the program thus being $88.28-100.33 in actual payments for drugs plus $3.16-3.60 for administration.

It should be emphasized, however (in case it is not already sufficiently obvious), that these estimates represent the outcome of a process of combining pieces of data from a variety of sources to construct a pattern. When data become available, there will be an actual, real cost of the Ontario pharmacare plan for 1975 which may deviate from these estimates for a variety of reasons. The purpose of this exercise is first, to illustrate a consistent process of program cost estimation which will relate estimates for universal and partial plans. This process can then be calibrated against actual experience and the sources of discrepancy (price? utilization response? relative utilization?) observed. Secondly, it provides a concrete basis against which to estimate the impact of alternative modes of organization of the drug delivery system. This permits alternative policies to be translated into (approximate) numbers of millions of dollars which should at least be of the correct order of magnitude.

Benchmark cost estimates for a deductible plan are more difficult to develop as they depend on the entire distribution of expenditures throughout the insured population as well as, of course, the pre-set level of the deductible. Since the purpose of the deductible plan is, however, to restrict insurance coverage *de facto* to those who spend relatively large amounts on drugs, the deductible will presumably be set somewhat above pre-insurance estimates of average *per capita* expense. In general, the more unequal the pre-insurance distribution of drug expense, the more costly will such a drug insurance program be to the insurer.

As an example, if one were to use the generalization by Greenlick and Darsky (1968) that 10 per cent of the population use 50 per cent of the prescriptions, and extend it to expenditures, then assuming average *per capita* (pre-insurance) expenditures of $29.77 in Ontario in 1975, the high-using 10 per cent would be spending $122.6/0.8237 = $148.84 each on average and the low-using 90 per cent would be spending $16.54 each. Assuming a deductible of $50 per annum, so that each person had to pay the first $50 of drug bills each year and would then receive full reimbursement for the rest (and also assuming that the highest of the low users never got above $50 per annum), the plan would cost $98.84 X 0.8237 = $81.41 million for costs of prescriptions for the high users. At $5.07 per prescription, the high users would be averaging 29.36 prescriptions each of which the first 9.86 would not be reimbursed, thus total prescriptions fully or partially reimbursed would be 19.50 X 0.8237 = 16.06 million. Administration cost of 20 cents added to the estimated charge of $5.07 per prescription makes total program costs of about $84.6 million. The additional costs due to utilization response are ambiguous – would the high-using population treat prescriptions as free and the deductible as a lump-sum tax, or would they make sequential decisions throughout the year and allow consumption to respond to the zero marginal cost only after the deductible had clearly been exceeded? In the former case, the 10-25 per cent utilization increase would apply to the whole $122.6 million spent by or on behalf of high users, giving rise to 2.4-6 million new prescriptions and additional costs (including administration) of $12.6-31.6 million. In the second case it would apply only to the insured component of high users' expenditures, and additional prescriptions would be 1.6-4.0 at costs of a further $8.4-21.1 million. Depending on the utilization response, then, total plan costs would run between $93.0 million and $116.2 million.

The illustration is oversimplified in that it assumes a very simple and unrealistic expenditure distribution. Nevertheless it brings out the key assumptions which must be made. We note, for example, that if all high users and low users are concentrated at the mean expenditures of their respective classes, a shift of say $10 in the deductible would bring about a direct change of about $8.2 million in program costs, might or might not influence the utilization level of the insured, but would not shift drug users between insured and uninsured (at the margin) groups. In a more realistic example, however, all three effects would be present.

The available literature, however, does not in general present conveniently smooth and continuous distributions of drug use expense. At best, one has reports of frequency distributions by expenditure or number of prescription classes, which are of course specific to a particular time and program. There does seem to be a general pattern, though, that about a third of the population will have no drug expense in a given year. This varies from around 40 per cent in younger age groups to perhaps 25 per cent for the over 65. Combining this with an estimate of $29.77 *per capita*, average expenses for those with any expenses must be about $44.66. To be meaningful, then, a deductible should be set above this amount. Of the population with positive drug expense in any year, most have relatively small expenses. Thus the US Task Force (*The Drug Users*, 1968) reports just over 50 per cent of the total population as having positive expenditures but under $50. The average price of a prescription in that survey was $3.60; raising this to the assumed price of $5.07 would yield a 40.8 per cent increase to just over $70. Similarly, Greenlick and Darsky (1968) reported for PSI data that just under 50 per cent of the population studied used fifteen or fewer prescriptions per year, and only 17 per cent had 16 or more. Since this was a retired population, it would seem that the estimate of the proportion in the low range must be conservative. If we chose, then, a cut-off of $75 for a deductible, we might be justified in assuming that half of the population would have expenditures below this level, another third would have no expenditures, and only 17 per cent would be above the cut-off. (For comparison, the present Manitoba pharmacare plan uses a $50 deductible but imposes a 20 per cent coinsurance rate above this level. A person with $100 annual drug expense would still pay $60.

Assuming that a $75 cut-off focuses the benefits of the plan on the high-using 17 per cent of the population, what proportion of total bills would be involved? One way to get at this is by exclusion – how much is spent by the low-using 50 per cent? If we assumed that this group spent an average $37.50 (half of $75) then their total expense would be 0.5 × 8.237 × $37.50 = $154.4 million, out of our assumed total provincial expense in 1975 of $245.2 million. But the $37.50 figure is probably incorrect. Greenlick and Darsky (1968) found that their low-using 50 per cent were split into low, medium, and high groups (1-5, 6-10, and 11-15 prescriptions) in the numerical proportions of roughly 4:2:1. Assuming that these proportions applied to the expense ranges $5-25, $25-50, and $50-75 (and assuming no user spends less than $5.00), would yield an estimated average expenditure for the low users of [(4 × $15) + (2 × $37.50) +

(1 X \$62.50)] / 7 = \$28.21, and a total expenditure by this group of 0.5 X 8.237 X \$28.21 = \$116.2 million. Baseline expenditure by the high-using 17 per cent would then be \$245.2 – \$116.2 = \$129.0 million. But of this amount, the deductible would be paid by the beneficiaries. This deductible paid by those who were (at the margin) insured could be estimated as 0.17 X 8.237 X \$75 = \$105.0 million. Hence, program drug costs would be the net amount, \$129.0 – \$105.0 = \$24.0 million.[13] To this, of course, one would have to add administrative costs and an allowance for increases in utilization – in this process the issue of whether prescription drug purchasers respond to the program sequentially or all at once, whether it influences their intra-deductible purchases or only those made after the deductible has been reached, obviously becomes critical. The program would require reimbursement of about 4.7 million prescriptions at an administrative cost of \$0.9 million. But an increase in utilization of 10-25 per cent would increase prescription costs to \$26.4-30.0 million if applied only to the insured prescriptions, with corresponding administration costs of \$1.0-1.1 million, for a total package of \$27.4-31.1 million. If on the other hand the whole utilization of the insured group were to expand, the 10-25 per cent increase would be on a base of a \$129.0 million rather than \$24.0 million. Net program costs could be approximately doubled, in the somewhat unlikely event of a large utilization response (25 per cent) combined with (accurate) forecasting by each heavy user at the beginning of the year that he/she would be purchasing drugs free at the margin after paying the equivalent of a \$75 lump sum tax. If on

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[13] This procedure implicitly assumes that since these data were collected the expenditures of the middle 50 per cent (neither high users nor low users) have been raised only by price increase, not utilization increase. If one allowed for utilization increase as well, total expenditures for this group since the mid-sixties would roughly double. One might expect that the Greenlick/Darsky middle 50 per cent would now be using between one and twenty prescriptions per year, and if this group is still divided 4:2:1 the ranges of numbers of prescriptions might be 1-7, 8-13, 14-20. The trouble is that this leads to an upper limit of \$100, (\$5.07 X 20) *per capita* for the middle 50 per cent, and an average expenditure of \$5.07 X 1/7 X [(4 X 4) + (2 X 10.5) + (1 X 17)] = \$39.11 for this group, or a total of 0.5 X 8.237 X \$39.11 = \$161.1 million. This leaves only \$245.2 – \$161.1 = \$84.1 million for the 17 per cent high users, or \$60.06 *per capita*, lower than the top end of the 'middle' users. Thus the doubling assumption is clearly wrong.

The procedure used here amounts to holding constant utilization by the non-using 33 per cent and the middle-using 50 per cent, and thus concentrating the utilization effect among the high users. It tends therefore to *overstate* the costs of the program (see appendix B) and thus to be relatively conservative. What may really have been happening over time is that non-users have been migrating into the middle-user group, and/or middle users into the high-user group, raising total utilization in a way which would spread total costs more evenly over the whole population and lower public expenditures for a deductible plan.

the other hand no utilization response occurs until the individual discovers that the deductible has been exhausted, the program costs appear to be in the $30 million range.

A high-deductible program can thus be relatively low cost, because it provides relatively small benefits. The estimates are of course very sensitive to the choice of deductible level; had we used $50 instead (and assuming the 50 per cent low users are divided 4:2:1) we would have extended coverage to a further 50/7 = 7.1 per cent of the population. Approximately, then, we would be covering 25 per cent of the population. Average expenditure for the 42 per cent low users would be [(4 × $15) + (2 × $37.50)]6 = $22.50; their total expenditures would be $22.50 × 0.42 × 8.237 = $77.8 million. The covered 25 per cent of the population would thus be generating spending of $245.2 – $77.8 = $167.4 million, of which the deductible would make up 0.25 × 8.237 × $50 = $103.0 million, and total program costs would be $64.4 million. Again adjusting for administrative costs and utilization response, and assuming the sequential decision-making case of utilization response only after the deductible is passed, additional utilization would raise prescription costs to $70.8-80.5 for the reimbursement of 14.0-15.9 million prescriptions, and additional administrative expense of $2.8-3.2 million. Total program costs would then be about $73.6-83.7 million.

The two cost estimates for the deductible plans thus span the estimates for an over-65 plan, and all are much below those of a universal plan (see Table 1).

These estimates require immediate qualification. First, all three partial plans should have additional costs added to them. Drug costs for social welfare recipients and the expensively and chronically ill under 65 will be included in some budget; these should be added to the cost of the over-65 plan to make it comparable with a universal plan. Similarly social welfare recipients will have to be forgiven the deductible under any deductible plan, and this too biases the comparison with a universal plan. The percentages of the population benefitting from the deductible plan are probably somewhat high, and could be tightened up by better data on the frequency distribution of drug expenditures through the population.

As a general proposition, then, a first-dollar plan for the aged and a $50 deductible plan seem to have roughly similar costs.[14] The latter, however,

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[14] On the basis of the Andersen *et al.* (1973) data above, one might argue that 'the aged' in terms of high prescription drug use patterns, actually includes all those over 55. If, however, we redefined 'the aged' to cover this group, the costs of a first-dollar plan for this group would more than double. Since the population aged 55-65 contains many relatively high-income earners, the wealth transfer effects of such a program would be distinctly mixed.

TABLE 1

Estimated total costs of a pharmacare program: various coverages (Ontario 1975)

Type of coverage	Costs ($ million)	% of population benefitting
Total population, first dollar	280.4-318.6	100
Over 65 only	65.0- 73.9	8.6
Total population, $75 deductible	27.4- 31.1	17.0
Total population, $50 deductible	73.6- 83.7	25.0

spreads smaller benefits over a much wider range of beneficiaries. It ensures that no member of the population will be exposed to risk of high drug expenditures; on the other hand no member is fully protected against drug expense. One might think then of the deductible plan as being preferable as a defense against risk, while the over-65 plan has greater income transfer effects. On the assumptions used, both have about equal effects on increasing utilization, although this is a very uncertain area. Since on balance the social benefit from increased utilization, particularly among already high users, is probably negative due to the increased probability of interactions, this consideration argues for a relatively high deductible. Finally, with respect to impacts on the supply side, a deductible plan ensures that all purchasers of prescriptions are exposed to market prices for some or all of their purchases. It may thus do less damage in attenuating competitive forces in the retail industry than an over-65 plan which isolates a small group of heavy purchasers completely from the market. The issue of supply-side organization and efficiency, however, and of how it might be weakened or improved within the context of a pharmacare program, is sufficiently extensive to deserve a chapter in its own right and to this we now turn.

3

Pharmacare and its alternatives: reshaping the delivery system

REGULATION OR THE MARKET – OR BOTH

The previous chapter focused on the demand side of pharmaceutical services and on the scale and cost of several alternative ways of providing drug insurance along traditional lines. In that discussion, some emphasis was placed on the degree to which pharmaceutical services for most of the population depart from the usual characteristics of insurability – low probability of large losses, probability of loss uncontrolled by the insured, and especially equal *ex ante* expectation of loss by the insured. Hence the justification for an insurance plan must be extended beyond risk-spreading to include wealth transfer objectives. The same argument can of course be made for medical and hospital insurance, but the departure of pharmaceutical services from 'insurability' is significantly more pronounced. In addition, it was stressed that a generalized insurance plan was likely to have the effects of increasing drug utilization (though the quantitative significance of this effect is subject to widely differing estimates). Given the widespread and growing concern among informed observers about the negative health effects of current levels of over-medication, increases in utilization may be considered a negative effect. Finally, any insurance plan, by reducing or eliminating the point-of-service charges paid by users of prescription drugs, thereby lowers their sensitivity to price differentials as between different drugs and/or different retail dispensers of the same drug. In this way it attenuates or removes any competitive or market constraints over the price or cost behaviour of the drug delivery system.

The seriousness of this latter effect, however, must be judged against one's perception of the strength of existing market forces. If physicians take no account of drug prices in prescribing drugs for uninsured patients, then of course price differentials will not affect drug choice (unless they become so high as to induce patient non-compliance). Moreover, the uninsured patient's choice among different retail outlets will not constrain retail pricing, insofar as pharmacists are able to maintain uniform prices (e.g., by promulgating uniform fixed dispensing fees), or raising consumer search costs (e.g., by declaring price advertising 'unethical'). If one views the drug delivery system as already so shot through with market distortions that the allocative role of the price system has been effectively destroyed, then the elimination of point-of-service charges to the consumer involves no further loss.[1] As noted above, however, there may be loss of opportunity in the sense that a more open and efficient delivery system might be a feasible objective to be sought by a balanced mix of competitive forces with public and professional regulation. A universal first-dollar insurance plan may foreclose this opportunity and freeze in place the existing system of drug delivery. Growth and change will then have to take place through administrative regulation and the associated political manœuvring, a process in which the public interest is at best only one of several forces represented.

How serious is this loss? The answer depends on the view that one takes of the relative efficiency of the existing drug delivery system, and/or of the potential for improvement through the regulatory or the market process. This chapter will focus on these two problems. First, we will attempt to make rough quantitative estimates of the order of magnitude of the costs of inefficiency in the existing delivery system. In this analysis, the delivery process can be partitioned into four components: manufacturing, wholesaling, dispensing, and prescribing. The major decision-making groups in this process, the drug manufacturers, the dispensing pharmacists, and the prescribing physicians, each have different objectives and constraints and the issue of efficiency or inefficiency in an economic sense presents itself in very different terms at each level. Particular emphasis will be placed on the dispensing level, not because the others are unimportant, but because they are not as directly affected by any form of pharmaceutical insurance plan. At each level an attempt will be made to suggest alternative policy strategies which could be associated with an insurance plan, including of course a 'do nothing' strategy, and to balance their potential costs and benefits.

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[1] One's viewpoint, of course, depends on one's standpoint. In this discussion, competitive forces are regarded as 'good' insofar as they encourage efficient production and distribution of drugs at a relatively low cost to the consumer. For the same reasons, a supplier of drugs (whether manufacturer or retailer) would regard price competition as 'bad' because it erodes profits and lowers supplier incomes for the consumer's benefit. Whether drug prices and costs are 'too high' obviously depends on whether one pays those prices, or receives them. The great advantage of competitive market forces is that they provide an impersonal mechanism for answering such questions. Hence the universal eagerness of suppliers to escape from competition through collusion or (industry-controlled) public regulations.

The history of health insurance in Canada over the past quarter century, however, has shown that in general significant intervention on the demand side of the process of delivery and consumption of a form of health care is inevitably balanced by some form of intervention on the supply side. This intervention has generally taken the form of increasingly detailed and sophisticated administrative regulation by government of the delivery of both hospital and medical care. While opinions are mixed over the success of this strategy, and particularly over what in practice are reasonable criteria for success, it seems fair to say that administrative regulation has not shown itself to be a very sharp-edged tool for improving the efficiency of health care delivery. It lacks the two major advantages of market-based pricing systems, their ability to generate information and their self-enforcing nature. A recurring theme in the discussion of this chapter will be the absence of firm information on what the true 'production function' of dispensing services looks like, or how much a prescription 'ought' to cost. The literature contains opinions on this subject generated by pharmacists and based on what they feel is an appropriate income for their services, but that is a different matter entirely. Similarly, open competitive bidding enables one to learn more about the marginal costs of manufacturing a given type of drug than any number of cost analyses or regulatory hearings, and the market process avoids enforcement problems by its impersonal nature. No regulatory agency is forced to go through the political exercise of defining the inherently undefinable – manpower 'needs,' 'fair' prices, and the like.

On the other side of the ledger, of course, price mechanisms suffer from (at least) two significant disadvantages. First, they are susceptible of a variety of different forms of distortion resulting from collusive behaviour by supplies. This varies from the explicit agreement or the 'conscious parallelism' of large firms in oligopolistic industries, through the 'ethical' rules of all professional organizations which discourage independent price-setting or using low prices as a marketing strategy, down to local understandings among a handful of retailers in a small town. Keeping the price system functioning smoothly requires a degree of public intervention to chip off the barnacles which have an inevitable tendency to impede its adjustment. Secondly, and most important in the health disciplines, the effectiveness of market processes depends critically on the level of information available to seller and buyer. If the buyer does not know and/or cannot find out at reasonable cost the characteristics of the goods or services he is buying, or their prices, then the results of the transaction can hardly be expected to have any properties of social optimality. Collusive behaviour by suppliers may exacerbate this information-gap problem. Professional organizations with formal rules against advertising and informal codes of behaviour restricting provision of evaluative information about members to the public obviously undercut the allocative role of the price mechanism.

It is this latter problem of inadequate buyer information which underlies, both historically and conceptually, the extensive substitution of regulatory power for market mechanisms in all areas of health care. Traditionally this substitution has taken place via the delegation of regulatory power to professional associations – Tuohy and Wolfson (1976) provide a well-articulated description of how the relation of professional association as agent of the state parallels that of professional person as agent of the patient. Increasingly, and particularly as the state assumes a greater share of financial responsibility, this regulatory power is shifting back from profession to state. But the issue of regulation versus market remains. The point that needs to be stressed, however, is that the choice of regulatory over market mechanisms in health care rests on an underlying assumption of lack of consumer information – the consumer in his political, collective capacity accepts public or private professional constraints to guard against the consequences of ill-informed individual choices.[2]

It does not follow, however, that *all* health care decisions fall into this category. There are clearly *some* decisions or choices to be made in the use or non-use of health care services for which the consumer can be expected to be reasonably informed and better able to act in his/her own interests than any ‘expert’ provider. Furthermore, it would clearly be erroneous to confuse situations where the necessary information is inherently too difficult for the average consumer to acquire, and those where it has been restricted by professional regulation. The fact that a legislatively sanctioned professional regulation prevents certain types of market from emerging does not prove that such markets could not function in the social interest (Havighurst, 1974; 1976).

This is not a laissez faire argument for complete deregulation of health care. A consumer ignorance argument seems a perfectly appropriate ground for the regulation of dangerous or unsafe drugs rather than letting the marketplace govern their use. The marketplace cannot be relied upon to weed out the snake oil salesman because of, *inter alia*, the technical difficulty of establishing cause and effect in the relation of drugs to health. But the same logic does not justify interfering with a consumer's decision to use a pharmacy with or without, e.g., delivery services. And if it does not, then it cannot justify preventing pharmacies from adjusting their relative prices to reflect their different service packages, and making these price differentials known to consumers. Only in this way can consumers indicate whether they consider the extra services worth their extra cost. Differential pricing information should be allowed to guide consumer choice whenever one can reasonably expect the consumer to have enough information to respond sensibly to price signals, or at least to respond as sensibly as anyone else would do on his/her behalf. It seems reasonable to accept that these conditions do *not* hold for, e.g., abdominal surgery – we do not want consumers to use price signals in deciding whether or not to have an appendix removed. But it does not follow that *no* consumer choice in health care matters should respond to price signals. The economic advantages to suppliers of such a situation are patent, but the underlying social justification is lacking. Hence we may reasonably seek a blend of price and non-price mechanisms, keeping in mind that to be fully effective, a price mechanism should have symmetric effects. Properly used, prices convey information and incentives to both consumers and suppliers, and this advantage should be exploited.

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[2] There are also, of course, externality arguments – the communicable disease case is obvious but quantitatively trivial. The issue of interdependent utility functions is more complex, but is partially covered in the assumption that influencing utilization is a social objective.

PHARMACEUTICAL DISPENSING – POTENTIAL PRODUCTIVITY INCREASES

In the discussion of alternative drug insurance programs, no attention was devoted to the capacity of the drug delivery system to provide any increased volume of prescriptions which might be generated in a 'free' system. The assumption was made that in a universal first-dollar system prescription volume in Ontario in 1975 might rise by 10-25 per cent or from 48.4 million (as the estimated total with no increase in utilization) to 53.2-60.5 million. A traditional approach to manpower planning in the health sector, the magic ratio approach, would then move to look at the pharmacist/population ratio, or population/pharmacist ratio, and calculate an associated adjustment in this ratio to derive a 'need' for new pharmacists to provide the extra dispensing services.[3]

[3] Actually this would be a fairly sophisticated use of manpower/population data. The traditional use of such ratios has cheerfully disregarded population characteristics such as age and sex structure or other factors influencing utilization. Such ratios also implicitly assume a fixed coefficients or Leontief production technology for health services, as the 'need' for any form of manpower is treated as independent of the availability of any other substitute personnel or facilities. The well-documented possibilities for

From the Canada Health Manpower inventory we can observe that the Ontario population/pharmacist ratio has been rising slowly since 1964, from 1649 in that year to 1731 in 1973, with relatively few departures from trend. Fitting a time trend leads to an estimate of 1742 for 1975, with a plausible range of perhaps 1735-1750, and comparing this with the estimated population of 8.237 million, a range of 'needed' pharmacists of 4707-4748 emerges. Using the central estimate of 4728, and adding an assumed 10-25 per cent estimate of increase in utilization, we get 'needed' new pharmacists of 473-1182 to support a new program. But however much such a calculation might gladden the hearts of a Faculty of Pharmacy, it is based on fundamentally faulty assumptions. It would be a serious and costly error to build a universal program on the basis of such a simple-minded expansion of the present delivery system.

The relationship between the stock of pharmacists available and the volume of prescriptions filled in a given region is subject to even more slippage than is typical of health personnel magic ratios in general, so that it is the least reliable of all such unreliable measures. This slippage arises from two sources. First, dispensing is a part-time activity for many pharmacists who typically combine this professional function with the management of a small retail establishment with a very diverse product line. The 'productivity' of a given pharmacist in the dispensing function obviously varies dramatically according to the distribution of working time between these activities; but it is evident that changes in this allocation pattern can have a major impact on pharmacist 'needs' to serve a given population. Secondly, the changes which have occurred in drug delivery over the last generation have, as is widely commented upon, shifted the dispensing role from compounding medicines from raw materials to 'counting and pouring' and labelling compounds which have been pre-packaged, pre-formulated, and require only transfer from larger to smaller containers. Unit dose packaging and computerized labelling may eliminate even these functions, reducing the 'professional' component of dispensing to that of deciphering the physician's handwriting. This technological obsolescence of the pharmacist's traditional professional role has led to energetic efforts among pharmacists to re-define a new role as pharmaceutical advisor to the patient and the physician rather than simply dispenser of medications; the potential implications of such a role in terms of manpower needs and particularly mode of organization of the dispensing function will be discussed below. At this point, however, it suffices to note that the changes in dispensing patterns have dramatically reduced the professional

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substitution of a variety of different forms of intermediate-level health professionals for more highly-trained and costly personnel are by the magic ratio technique completely ignored without the necessity of explicit recognition.

component of the dispensing process and have thus increased the potential for use of less extensively trained auxiliaries or assistants to take over a large part of the pharmacist's traditional role. In this way, the linkage between the volume of dispensing *per se* and the need for professional pharmacists is further eroded. In general, then, the existing stock of pharmacists are employed only part-time in dispensing, and for much of that time are employed in performing activities which are well below their levels of professional training. There is therefore no reason to believe that an expansion of the volume of prescriptions dispensed would require an increase in the stock of pharmacists, and every reason to believe that a more efficient delivery system could provide more prescriptions with fewer pharmacists.

The Canadian Drug Expenditure Survey (1970) reported an average workload of 7121 prescriptions per pharmacist annually, but this is clearly not a theoretical maximum as the survey found a large number of pharmacies (30 per cent of their survey of 3188) dispensing 5000 or fewer prescriptions per pharmacist per year and thus depressing the average. At the other end, a small number of pharmacies reported volumes of over 20,000 prescriptions per pharmacist. Since that time, the population/pharmacist ratio has trended slowly up and the volume of prescriptions *per capita* has certainly risen. The estimates used in this study of 48.4 million prescriptions (not allowing for utilization increase due to insurance) and 1742 persons per pharmacist imply 48.4 million/4728 = 10,236 prescriptions per pharmacist per year, which is quite close to the 10,000 prescriptions per pharmacist assumed as a reasonable workload by the Commission on Pharmaceutical Services (1971, 352) in calculating the 'pharmacist deficit' for Canada down to 1980.[4] The CPS estimates, however, refer to retail pharmacists only, for whom a 'desirable' population/pharmacist ratio of 1900 is assumed. If we assume approximately 90 per cent of pharmacists in Ontario to be in retail occupations, then 1742 persons per pharmacist becomes 1936 per retail pharmacist, again fairly close to the CPS 'optimum,' and the workload per retail pharmacist per year goes to 11,375 prescriptions.

But the data presented by the CPS themselves undercut any notion that this level reflects an optimum. Interprovincial variation in the prescriptions dispensed per pharmacist runs from 6.2 thousand per year in Manitoba (6.5 in Ontario) to 15.3 thousand in Quebec (p. 328). For Canada as a whole the average is said to have moved from 5000 to 8300 in five years. It is clear that so unstable a relation cannot be used as a basis for manpower planning, and averaging merely obscures the issue.

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[4] The 'X-deficit' is a mythical number sought by studies of health manpower of type X through the manipulation of magic ratios. The methodology of such studies generally defines 'needs' for X-manpower in such a way that a shortage must be found unless an arithmetical error is made. Faculty of training institutions for X-manpower tend to be well represented in the conduct of such studies.

A more recent illustration of the difficulty of linking drug utilization with pharmacist manpower is provided by Josie (1973) who reports that the four Canadian regions studied as part of WHO-ICS-MCU had pharmacist/population ratios of 2.2, 9.4, 6.5, and 5.2 per ten thousand population. In terms of population per pharmacist, these become 4545, 1064, 1538, and 1923. Moreover, the region with fewest pharmacists had the highest proportion of a set of standard drugs on the prescription list. It did appear that morbidity and drug use were both lower in the region with fewer pharmacists, but not in any way proportionate to this difference. The number of all medications taken per thousand people in each region in a sample 48-hour period was (age-sex adjusted) 920, 1046, 900, and 922; and of prescription drugs, 423, 486, 391, and 424. The varying proportions of the population reporting different degrees of morbidity likewise varied in a range of 15-30 per cent – nowhere near the range of 4:1 in pharmacist availability but reasonably close to the range in drug use. Morbidity appears associated with drug use, but neither is associated with the pharmacist stock!

So we have to go at the problem another way. A high-volume 'discount-image' drug retailer uses as a standard 12-15 prescriptions per employed pharmacist per hour. Using a seven-hour day, 11-month working year, and 20-day working month, this yields 18,480-23,100 prescriptions per year – in the range of the high-reporting pharmacies of the NHW Drug Expenditure Survey (1970). McCaffree and Newman (1968) report a higher ratio than this, 130 per day compared with 84-105, but their figure includes extended auxiliary use. The extent of auxiliary use embodied in the 12-15 figure is unspecified. A study done for the US Health Resources administration on the effects of task delegation in a set of health disciplines (1974) includes an estimate of the productivity of 'HMO' versus 'community' pharmacists, each without aides; and estimates 38 per cent higher productivity for the 'HMO' group due to more time being spent on dispensing – applying this ratio to our estimated average of 11,300 for the Ontario retail pharmacist in 1975 would yield 15,594 prescriptions per pharmacist.

This calculation is not far different in relative terms from one which can be derived from the Lilly Digest (1975). If one takes the reported number of prescriptions per pharmacy per year, converts this to an estimate of the per pharmacist equivalent by dividing by the sum of reported hours per week worked by the proprietor and the employee pharmacists and then multiplies by a standardizing 35 hours per week, the result is a crude value of prescriptions per FTE (full-time equivalent) pharmacist. It will probably be low, insofar as the proprietor at least will be spending considerable time managing the retail business. Nevertheless *relative* values may be interesting, particularly since 'prescription-oriented' pharmacies are broken out and can be compared with the more typical mixed product line pharmacy.

In general, prescriptions dispensed per pharmacist rises with absolute pharmacy size. It is about 6.7 thousand for very small (under $100,000 annual sales) establishments, runs between 8.3 and 8.9 thousand for establishments of $100,000-160,000 sales, 10.2 to 10.7 thousand in the range $160,000-350,000 and rises to 13.0 thousand in the $500,000 plus sales range. But pharmacies with 80 per cent or more of their sales from prescriptions dispense 13.5 thousand per FTE pharmacist, even though their average sales volume puts them in a relatively small pharmacy class. Looking only at prescription sales, such 80 per cent+ dispensaries average $129.4 thousand annual prescription sales and dispense about 25.8 thousand prescriptions. This is roughly equivalent to the $122.5 and 25.4 thousand of pharmacies in the total sales $225-250 thousand class, where prescriptions per FTE pharmacist are only 10.5 thousand, implying a productivity gain of 13.5/10.5 = 28.7 per cent. Even these pharmacies, however, are still not fully specialized as dispensaries.

The apparent increase in productivity per pharmacist revealed in the Lilly US data as the size of the pharmacy increases has been confirmed as measured economies of scale in the US industry (see Cady, 1975) and shows up as a tendency for larger pharmacies to have lower prescription costs and prices. This tendency does not appear to show up in the Canadian data provided in annual surveys of pharmacy by the C.PH.A.,[5] or in such data as are available from pharmacare records (see below). But the tendency for specialized dispensaries to have higher rates of prescriptions per pharmacist per year certainly does emerge – which is hardly surprising.

It is not obvious how one can pull these diverse sources together, because an accurate comparison would require a detailed task analysis and allocation of tasks as between pharmacist and auxiliary. The effects of task delegation study (US, Dept. of Health, Education, and Welfare, 1974) does in fact do this; working from specific observations of the task content of community pharmacy it is estimated that the potential increase in productivity which could be achieved by maximum task delegation to auxiliaries is 85 per cent. This results from a calculation that 42.3 per cent of the observed time use is non-delegatable, and a further 11.6 per cent would be needed for supervision of delegated tasks; 1.0/(0.423 + 0.116) = 1.85. In addition, however, a pharmacist working in a health maintenance organization or other setting in which dispensing more nearly approximated a full-time occupation could achieve as noted above a further productivity increase. It was estimated that in such a setting a pharmacist would spend 74.2 per cent of his time in prescription-related activity as compared with 53.6 per cent for a community pharmacist – hence the 38 per cent productivity gain. Putting this together with the 85 per cent gain from delegation, yields a potential increase of 156 per cent. This is a theoretical upper limit; a corresponding lower limit is defined from relative earnings and productivity of aides and pharmacists on the basis of the minimum threshold productivity gain which makes aide use economically feasible. This turns out to be 50 per cent – a team of one pharmacist and one aide must produce 50 per cent more than a pharmacist alone – and 1.5 × 1.38 = 2.07 so the low estimate of productivity gain is 107 per cent.

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[5] The C.Ph.A's 'cost per prescription dispensed' formula (Commission on Pharmaceutical Services, 1971, 340) is, however, biased sharply *against* finding scale economies. It is computed as total expenses less proprietor's salary, scaled down by the ratio of prescription sales to total sales, then divided by number of prescriptions dispensed. To this 'expense' per prescription is then added a direct labour charge. Since gross retail margins are much higher on pharmaceuticals than on other products, allocation of total expenses by the ratio of prescription to other *sales* will significantly overstate the proportion of *expenses* properly allocatable to prescriptions. This leads to an overstatement of costs, making the formula a useful bargaining tool for negotiations with reimbursing agencies. Presumably that is why the bias was built in. The bias will be higher, the lower the ratio of pharmaceutical to total sales, and that ratio tends to fall with pharmacy size.

Matching these with our estimated baseline of 11,300 prescriptions per pharmacist in community pharmacy, Ontario, 1975, we get a range of 23,400 – 28,900 as potential output levels through increased auxiliary use and a higher proportion of pharmacist time spent dispensing. This compares reasonably well with McCaffree and Newman's 130 per day, which assuming an 11-month year, 20 working days per month, yields 28,600 prescriptions per pharmacist, and is somewhat above the 18,480-23,100 reported for full-time salaried pharmacists in a high-volume discount pharmacy which presumably reflects a lower level of task delegation due to the collective constraints imposed by pharmaceutical organizations.

Interestingly enough, the Commission on Pharmaceutical Services (1971, 238) also quotes an estimate that 'under ideal conditions' a pharmacist could dispense 80 to 120 prescriptions a day. In a 220-day working year, this becomes 17,600 to 26,400, rather a wide range but far above current levels. Later, however, they back away from this estimate and its implications and suggest (358) that a full workload for a pharmacist engaged 'primarily in dispensing' would be 20,000, and 'When the average number dispensed per pharmacist reaches the range 10,000-15,000 *even with non-professional assistance*, (our emphasis) it should be assumed that the upper limit has been reached and that there is a need for more pharmacists to dispense any increase in prescription volume.' The slide from 26,400 per year to 10,000 is somewhat breathtaking, to say the least! Still, it is absolutely necessary if one is to discover a shortage of pharmacists.

It would appear, then, that a rationalized pharmaceutical dispensing system could increase prescription output per retail pharmacist per year by a factor of 100-150 per cent, by a combination of more aide use and less pharmacist time selling non-prescription products. This leads to three main areas of enquiry. (1) What reduction in drug costs could be achieved by such rationalization? Substitution of aides for pharmacists would lower, but not eliminate, wage costs. And a full-time pharmacist requires a full-time salary; does the front store help to hold down drug costs? (2) What institutional mechanisms are available for moving in the direction of greater efficiency and rationalization of the pharmacist's role? (3) These productivity gains result from treating the pharmacist's function as dispensing only, and suggest a very large over-supply of pharmacists. If the advisory role of the pharmacist is expanded, more professional time might be needed per prescription. More generally, the 'over-supply' of pharmacists yields convenience benefits to consumers (lowered travel time, etc.), in addition to professional services associated with dispensing, and these may be lost in a 'rationalized' system.

ECONOMIC GAINS FROM THE RATIONALIZATION OF DISPENSING

The first point turns on the relative profitability of dispensing *per se*. Implicitly, the rationalization argument treats dispensing as an activity which is considerably more profitable than selling Kleenex, such that a smaller retail industry specializing in dispensing and organized to do so efficiently could maintain present levels of pharmacist incomes (but *not* present numbers of pharmacists) while passing significant cost savings on to consumers. (In this context, a specialized dispensary might perfectly well be located *in* a department store or other retail outlet. The key point is that the *pharmacist* should be a specialized dispenser, not the premises). Yet it is sometimes asserted that a pharmacy is not economically viable without a large non-prescription business, and it is only by combining the two functions that pharmacies are able to ensure that the community has access to drugs at all. Apparently confirming this, specialized dispensaries seem to charge higher, not lower, prices for prescriptions. Generalizing from the experience of individual pharmacies to the industry as a whole, however, involves a fallacy of composition. If the industry is indeed oversupplied with dispensing capacity to the degree suggested above, then of course individual pharmacists cannot be fully employed in dispensing. Since the volume of prescriptions is primarily controlled by physicians, the excess numbers of pharmacists can be employed only in non-prescription retailing. It is the excess supply problem which makes dispensing appear insufficient as an economic base for the individual store. But in aggregate, dispensing is clearly a highly profitable activity. Surveys of pharmacies show sales per square foot in the dispensary of the order of nine to ten times those in the rest of the pharmacy, and the inventory to sales ratio is lower by one-third to one-half (Fuller, 1976). At the same time gross margins on prescription drugs in Ontario (1972) are reported (Fuller, 1974) as being 52 per cent of sales, compared with 25 per cent on other items. Net profit as a percentage of gross sales was reported as 10.5 per cent for prescription drugs, 1.6 per cent for other items. And even that differential is probably understated, as pointed out above (note 5) the C.PH.A. formula for pharmacy expense allocation between prescription and non-prescription drugs significantly over-allocates expenses to the latter.

It seems clear, then that dispensary *per se* generates much higher *rates* of profit than selling Kleenex. If pharmacies are not economically viable without a large non-prescription business, that merely underscores the conclusion that dispensing capacity is in over-supply. As for the observed higher prescription prices in specialized dispensaries, that is not difficult to explain in terms of lower demand elasticities due to favourable locations, e.g., medical buildings. The Lilly Digest (1975) reports that rent (in US) as a percentage of sales is 4.5 per cent of sales for specialized dispensaries (80 per cent or more of sales in prescription drugs) compared with 2.5 per cent for all pharmacies, and 2.4 per cent for all pharmacies in the average sales size class corresponding to the average size of dispensaries. It seems probable, then, that dispensaries locate in medical buildings where patients are willing to pay higher prices due to convenience or physician steering; they pay higher rents for this privilege which then return as higher profits to the building owners.

By how much, then, might prescription costs fall if the dispensing process were rationalized? To begin with, we note that of the estimated $5.07 cost of a prescription, a significant share is ingredient cost. Fuller reports a 1972 gross margin of just over 50 per cent on prescriptions, BC pharmacare data show dispensing fees closer to 45 per cent of total costs but then ingredient costs are above average for the elderly. Green Shield (1975) reports dispensing fees in Ontario averaging about 45 per cent of prescription costs but rising somewhat faster during 1974; moreover discounting by manufacturers and wholesalers will lead to the pharmacist's margin being a bit above the professional fee due to profits on ingredients. On the whole Fuller's 50 per cent is probably a conservative estimate, dispensing costs per prescription can then be assumed at \$2.54.[6]

To break this figure down, we can examine the cost structure of an 'average' pharmacy as reported by the C.PH.A. surveys. Roughly speaking, sales in the average pharmacy for prescription and non-prescription products together divide into 65 per cent cost of goods sold, 10 per cent non-salary expenses, 7.5 per cent proprietor's salary, 12.5 per cent other salaries, and 5 per cent net profit. If we assume that other salaries are divided between pharmacist and non-pharmacist personnel, and that the average pharmacy has one salaried pharmacist in addition to the proprietor who receives a salary equal to that imputed for the proprietor (but not, of course, a share of profits), then we can divide the 12.5 per cent into 7.5 per cent for salaried pharmacists and 5 per cent for non-pharmacists. These ratios refer to the whole pharmacy operation, however, not merely the dispensary. Attempting to establish such ratios independently for the dispensary and non-dispensary components turns up some curiosities which are displayed in Table 2. This table is modified from data by Fuller (1973) and (1974) mostly by rounding off numbers and imposing an element of neatness which does not, however, seriously misrepresent the original data. The problem is, of course, to find a way of filling in the missing sub-matrix.

In this table and subsequently, 1972 dollar figures are used because more data are published and available in Canada for that year. Proportions derived from that year are brought forward to 1975. This should be kept in mind in assessing, e.g., the plausibility of salary or expense levels.

Fuller (1974) lumps all expense categories into one, and to an approximation one could massage his reported expense and profit data – without implicating him in any way in the results! – to give hypothetical dispensary expenses and net profits as \$27,500 and \$7500; and corresponding non-dispensary expenses and net profits of \$32,500 and \$2500. The trouble with this calculation is that, like the C.PH.A. formula mentioned above, it loads a very high expense component onto the dispensary. If one looks at non-salary expenses, for example, these include expenses for 'physical plant' – rent, depreciation, building services,

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[6] This particular ratio, while not methodologically critical, does have a significant bearing on the quantitative estimates of potential savings to be achieved through rationalization of the dispensing process. In general, the larger the proportion of prescription drug costs made up of dispensing charges, the greater the potential gains from making dispensing more efficient. Thus if dispensing charges are in fact 60 per cent, not 50 per cent, of prescription prices, one would adjust subsequent estimates of percentage reductions in total prescription prices by multiplying by 0.6/0.5 = 1.2. An estimated 16.7 per cent gain becomes 20 per cent.

TABLE 2

Hypothetical cost allocation for an 'average' pharmacy with sales of $200,000 per year (1972 $)

	Total pharmacy	Dispensary	Front store
Total sales	200,000	70,000	130,000
Cost of goods sold	130,000	35,000	95,000
Gross margin	70,000	35,000	35,000
Non-salary expenses	20,000	See text	
Proprietor's salary	15,000	See text	
Other salaries	25,000	See text	
Net profit	10,000	See text	

taxes – which clearly should be allocated by floor area and should reflect the very small floor area accounted for by the dispensary. Similarly, advertising tends to focus on non-prescription items, due to ethical restraints. A 50-50 split of such costs seems hard to justify when 90 per cent of the floor area is devoted to the front store. If one allocated non-salary expenses 80-20, then one would charge the dispensary in our hypothetical example $4000 and the front store $16,000. This leaves $40,000 in salaries and $10,000 in net profit to be allocated. Some of these salaries are paid to non-pharmacists, hence one cannot charge a high proportion of these to the dispensary. For pharmacists, we have estimated that current dispensing output is about half its theoretical maximum, so a 50-50 split of these salaries seems appropriate and consistent with the effects of task delegation report (US, Dept. of Health, Education, and Welfare, 1974) on the actual distribution of pharmacist time. Yet even a 50-50 salary split, combined with the allocation of $16,000 of non-salary expense to the front store, more than exhausts the gross margin from that activity! The data suggest a *loss* on non-pharmaceutical items unless one follows Fuller's procedure of overloading expenses onto the dispensary.

This peculiar result may well arise as a result of an implicit assumption in our procedure, that pharmacist time is priced at the same rate regardless of how it is used. As explained in chapter six, the cost of labour services supplied by self-employed health professionals is determined by the value which they place on their own time. The opportunity cost to a pharmacist of time spent waiting between prescriptions is likely to be very low. Hence the time used to run the non-prescription business is implicitly priced at a very low level, and an allocation of labour costs by time used in each activity fails to allow for this differential time-price for the self-employed proprietor. If a surplus of dispensers exists, there is no reason why marginal and average time-prices should be equal and indeed marginal time price may be very low.

In fact, however, the exact allocation of salaries between proprietor, employed pharmacists, and non-pharmacists is not critical to the problem here addressed. The question is, if the typical or representative pharmacy were converted to a dispensary, and made optimal use of pharmacists and pharmacists' aides, what would its new cost structure look like? The 'representative pharmacy' of Table 2 with $70,000 in prescription sales employed one pharmacist in addition to the proprietor and each dispensed 8000-9000 prescriptions per year. For that establishment, therefore, a tripling of output per pharmacist would raise output to 24,000-27,000 prescriptions per year – within the range indicated above for the full-time dispensing pharmacist making maximum use of delegation. The estimated 150 per cent increase from the effects of task delegation study (US, Dept. of Health, Education, and Welfare, 1974) would raise the annual rate to 20,000-22,500. This assumes, of course, that in converting to a dispensary the pharmacy can in fact expand its dispensing activities in this way, i.e., the surplus of dispensing capacity which now exists is assumed away. The objective is to estimate a theoretical relationship – how (or whether) to try to achieve such effects in practice is another issue.

Assuming no front store, and an increase of 150-200 per cent in prescription sales, total annual sales become $175,000-210,000 in the hypothetical pharmacy above but gross margins soar to $87,500-105,000 reflecting the higher mark-up on prescription drugs. Non-salary expenses should fall, because the dispensary does not require the same floor area as the rest of the retail store. In general, the dispensary in a representative pharmacy takes up about 15 per cent or less of floor area while accounting for about one-third of sales. Thus a conservative estimate would be that floor area could fall to 40-50 per cent of the original. Since the bulk of non-salary, non-cost-of-goods-sold expenses are associated with the space used, these could be cut to 40-50 per cent as well, or $8000-10,000, depending on the volume of prescriptions dispensed. Subtracting these costs from the gross margin above, an amount of $79,500-95,000, or rounding $80,000-95,000, is left for salaries and profit, compared with $50,000 in the old mixed pharmacy.

Some of this, of course, must be allocated to non-pharmacist wages. In the mixed pharmacy we had assumed that the 12.5 per cent wage component divided 7.5 per cent employed pharmacist, 5 per cent other workers. In the dispensary, the pharmacy aide will substitute for the front-store clerk and will have to be paid more. If we assume that an aide salary is two-thirds that of a pharmacist, that each has one aide, and that pharmacist salaries and net profit do not change, then new aide salaries will be $20,000 compared with the old $10,000. Thus we have assumed a doubling of the cost of non-pharmacy aides to support the new expanded aide role, which seems fairly generous keeping in mind that aide time is being released from the non-prescription store as well.

The result is a 'net margin' of $60,000-75,000 to be shared between the proprietor and the employed pharmacist, compared with $40,000 in the mixed pharmacy case. More efficient use of the pharmacist's time generates a 'saving' of $20,000-35,000. If this were all passed on to drug users in terms of lower prices, leaving the pharmacists as well off as they were before, the average reduction in drug prices would be ($20,000/175,000) – ($35,000/210,000) = 11.4 – 16.7 per cent. (This percentage is based on the full retail price of the prescription; the reduction in the dispensing cost is of course 22.8-33.3 per cent.)

This calculation thus gives us an estimate of the order of magnitude of the theoretical savings which could be achieved by a more efficient use of professional manpower in pharmacy. It suggests that the social cost of using highly-trained pharmacists to 'count and pour' and sell Kleenex is between 58 cents and 85 cents per prescription (on the estimated 1975 base of $5.07). On a universal, first-dollar pharmaceutical insurance program with an assumed total cost of roughly $300 million, the annual cost of misusing pharmacy manpower becomes $35-50 million. This calculation includes only the retail costs, of course, since the more effective use of pharmacists would reduce the training needs to 33-40 per cent of their current level as well with resulting savings in university programs – no attempt has been made to cost these out.

Nevertheless it appears that while the institutional changes suggested here are quite dramatic in terms of the scale and organization of pharmacy, the estimated benefits are relatively conservative. A tripling of dispensing output per pharmacist sounds like a very high level, but it is achieved by substituting four full-time workers (two pharmacists, two aides) for two part-timers (pharmacists). Moreover, if changes in dispensing technology have progressed such that in fact the 1:1 ratio is now too low, say one pharmacist can direct two dispensing aides, the cost framework above would suggest that with a six-person workforce and a corresponding further 50 per cent output expansion, prescription sales could rise to $315,000, gross margin to $157,500, non-wage expenses to $15,000, and non-pharmacist wages to $40,000. The residual available for distribution among pharmacists would then be $102,500 compared with $40,000 for the current 'representative pharmacy,' making possible theoretical prescription price cuts of $62,500/315,000 = 19.8 per cent, or about $1.00 per prescription. This is of course $60 million per year out of a $300 million insurance program. Alternatively, if pharmacy aide salaries turned out to be one-half of pharmacists' earnings, not two-thirds, estimated potential price reductions would go from

11.4-16.7 per cent in the four-person case to 14.3-19.0 per cent. Thus changes in assumptions can shift the estimate around within the range 10-20 per cent, but considering that only the dispensing half of prescription prices is being analysed, these represent reductions of 20-40 per cent in dispensing costs and are additive to any efficiencies which might be achieved with respect to ingredient costs.

A proper interpretation of the significance of these estimates requires recognition of two major points. First, as the surrounding discussion was intended to emphasize, they are based on a large number of specific estimates, assumptions. and guesses about the cost and productivity structure of pharmaceutical dispensing. The structural parameters used are believed to be 'most plausible' in each case, but another observer or analyst might disagree. The intention of the analysis has been to develop an analytic structure, such that one could if one chose insert alternative parameter estimates and come out with different predictions. A framework has been set up which allows one to move from the universal generalization that retail pharmacy makes inefficient use of professional manpower to a specific dollar value of the resulting effects in terms of increases in prescription prices and insurance program expenditures, and the order of magnitude of these effects appears to be quite significant. The usefulness of this exercise would not be vitiated by the discovery that any particular parameter value used above was in fact inaccurate – one could simply insert the new, more accurate value and re-estimate the dollar effects.

The second factor which cannot be over-emphasized is that any estimation process of this sort is inherently inferior to the information generated by a freely-functioning competitive market. This is a major advantage of market-type regulatory mechanisms over administrative regulation – the market mechanisms generate cost, price, and productivity information automatically. On the other hand, administrative regulation creates incentives for those regulated to conceal or distort production data, as witness the C.PH.A.'s formula for the cost of a prescription (note 5 above). Thus uncertainty about or disagreement over the actual parameter values used in the analysis above is an indirect argument in favour of institutional changes which create incentives for retail pharmacies to generate such information.

This in turn leads to the questions surrounding change in the existing delivery system, which would inevitably be a relatively long-run process. The excess costs of inefficient manpower use are associated with a very large oversupply of dispensing capacity, which will take a number of years to work off. Since 'dispensing capacity' is not physical capital, which can be kept idle when not needed or scrapped when obsolescent, but human capital embodied in professional pharmacists, any rapid transition would have major effects on the income and wealth of this group. A more efficient pharmaceutical dispensing process can be achieved without economic loss (or even with significant gain) to pharmacists *in the long run*; but the transition period in which the stock of pharmacists is reduced to a level appropriate to society's needs will require cushioning.[7]

THE PROCESS OF RATIONALIZATION

Assuming that the social costs of the present misuse of professional manpower are considered significant enough to justify attempts to move to a more rational system, the immediate question arises – how? The options available in terms of social policy can be roughly divided into three categories – extension of market forces, administrative regulation, and direct public supply. The latter two are compatible with a universal first-dollar insurance program, the former is obviously not.[8]

In order for rationalization to occur through market forces, more efficient pharmacies must be able to expand their market shares. The normal method by which this is achieved in the rest of the economy is through attraction of more customers by lower prices. This process is critical, because as noted above the increases in efficiency and potential price reductions can occur only if each pharmacist is in fact serving a larger population. Price reductions are possible because the high margin, high mark-up prescription sales are concentrated in a smaller group of pharmacists. This group is thus enabled to reduce prices and mark-ups on prescriptions while protecting or enhancing their own incomes, and moreover is forced to do so in order to expand their market shares. But this process can be short-circuited in several ways. First a universal insurance plan would mean that market shares do not respond to relative prices. Second, collusive behaviour by pharmacists to set common dispensing fees and to make price advertising unethical discourages attempts to expand market shares by making it difficult to convey the relevant information to the public. And third, direct regulation by pharmacy associations of the dispensing process, e.g., by restricting delegation of tasks, can make increased efficiency impossible. The effects of regulation and restrictions on advertising are analysed by Cady (1975) for the US and calculated to increase drug retailing costs there in 1970 by $220-242 million – he did not explicitly include in his estimates possible use of pharmaceutical aides.

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[7] Actually the most serious adjustment problem will probably be in universities. A tripling of productivity per pharmacist implies a reduction by two-thirds in the needed pharmacist stock, which can only be achieved by drastically reducing training programs as well as continuing to emphasize the more professional, non-dispensing, pharmacist roles. The latter, however, are quantitatively insignificant compared with the dispensary role.

[8] There is in a sense a fourth option, compatible with a partial though not a full universal insurance plan. That is to insure part of the community, e.g., the over-65 population, but to require that all pharmacies charge the same price to insured and uninsured alike. One might then hope that market forces in the uninsured market would limit runaway prescription prices for the insured with a minimum of direct regulation, and that these uninsured market forces would generally continue (albeit at a slower pace) the past trends shown by the Commission on Pharmaceutical Services towards increasing the share of prescription drug sales in pharmacy activities. Statistical data from the BC pharmacare plan bearing on the presence or absence of such market forces will be examined in appendix C, but in general it seems fair to say that such forces are unlikely to make much headway against the continuing production of pharmacists by schools of pharmacy and the tendency toward collusive pricing embodied in uniform professional dispensing fees. Chapter six addresses in some detail the theoretical reasons why efficiency-inducing technical change may be blocked in a self-employed profession. The present mode of pharmacy organization makes market pressures too easy to subvert.

It follows, then, that a market-oriented strategy such as that recommended by the US Federal Trade Commission (1974) in that country would involve elimination of the pharmaceutical profession's self-imposed restraints on price advertising and physical organization of the dispensary. In this context it should be noted that price advertising and price posting are very different – work by Masson (1974) in the US suggests that price-posting alone does not convey enough information to consumers to have a significant effect on retail drug prices – not surprising since visiting a number of pharmacies to read their posted prices is a relatively costly method of acquiring price information. Moreover evidence gathered by the Federal Trade Commission in the US suggests that in-store price posting may be regarded as a tactical manœuvre to protect existing laws against price advertising, precisely *because* it does not influence market shares.

The argument in favour of market mechanisms rests on the assumption that consumers know what they are buying. In this respect, price advertising is not very helpful if consumers are unaware of the contents of their prescriptions. In general, social opinion seems to be moving toward the view that people have a right to know what drugs they are taking and moreover that ignorance in this area can be extremely hazardous. Nevertheless it is certainly true that consumers can hardly be expected to price-shop in an informed manner over the wide range of pharmaceutical preparations now in existence.

But the development of the dispensing fee concept solves this problem, in a way which permits blending of market incentives with pharmaceutical insurance. If the price of a prescription is regarded as two payments, one for the (variable) ingredient cost and one for the (constant) dispensing service, the level of consumer knowledge as between these two transactions is very different. The consumer can hardly be expected to judge his need for the ingredients (that is why he or she consults a physician) or to price-shop intelligently in the fecund jungle of pharmaceutical preparations. But the dispensing process is much more standardized and susceptible to consumer judgment. And in keeping with the principle that price signals and market mechanisms are appropriate when consumers are (or can be) informed about the properties of the good or service bought, and are not when they are not, a strong logical case seems to emerge for the Saskatchewan system of insuring the ingredient cost and requiring the patient to pay the dispensing charge.

Such a program appears to achieve a good blend of insurance effects – reducing prescription costs to high users – while preserving and even enhancing competitive forces which would encourage rationalization of the dispensing process. It would reduce out-of-pocket drug costs to the public by roughly 50 per cent initially, then (on the basis of the estimates above) by a further 11.4-16.7 per cent as dispensing costs fell. For the small proportion of the population who were still at risk of unacceptably high drug costs, a deductible plan would be a very low-cost addition to the total package. At the same time, market forces would be strengthened relative to the existing system, even though consumers would be paying a lower proportion of drug costs. This occurs because the transaction being priced, the dispensing act, is much more standardized than the compound good/service, a dispensed prescription. Prescription drug buyers enter into this transaction with a higher level of capability to judge the service received, and if open price advertising also provides them with information on relative dispensing charges, their sensitivity to price differentials will be greatly enhanced. This in turn gives the efficient dispenser the necessary mechanism whereby to expand his/her market share, and support the increase in productivity.[9] At the same time, the fact that the patient pays the dispensing

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[9] It is implicitly assumed throughout this discussion that, while the aggregate market demand for prescription drugs has a relatively low price elasticity, that faced by any individual pharmacy is not only greater but also greater than unity such that a lowered dispensing fee will in fact increase market share. In a world of transactions costs, particularly transportation costs, this is not necessarily so. The greater the degree of spatial market segmentation, the lower will be the inter-pharmacy cross elasticities of demand and the weaker will be the strategy of open competition as a policy to achieve the potential gains measured above.

There are, however, indirect reasons for believing that this is not a serious problem. The policies suggested will certainly increase the demand elasticity faced by the individual pharmacy. If it remains below unity, then *a fortiori* it must be even less elastic now. If so, what determines or even bounds the present pricing policies of pharmacies? Moreover the general opposition of organized pharmacy to more open competition is suggestive of perceived high cross-elasticities; if the market were highly segmented charge will limit increases in utilization resulting from insurance coverage. Unlike the British National Health Service prescription charge, however, the Saskatchewan plan uses the price mechanism in a symmetrical role – moderating utilization by consumers *and* creating efficiency incentives for suppliers. It is this symmetry which is so often lacking in proposals for coinsurance or other patient participation in health care payment – typically such proposals (unlike the price system in the non-health economy) are aimed only at the patient.[10]

But if market forces are not used as an engine of rationalization, what alternatives exist? Administrative regulation, has been used and continues to be used to try to control drug costs – PARCOST in Ontario and the MAC (maximum allowable cost for drugs) program set up by the US Department of Health, Education, and Welfare under its Medicare program are obvious examples. In general, however, such programs seem to be aimed at ingredient cost, rather than dispensing cost. PARCOST encourages the physician to prescribe lower-priced variants of chemically equivalent drugs. The current Ontario pharmacare plan similarly encourages substitution by reimbursing for a given drug at the lowest price in that drug's equivalence class. MAC limits the amount US medicare will pay for a given drug on a regional basis. But any program embodying a negotiated dispensing fee has little or no power to encourage dispensing efficiency. One may try to negotiate a 'tight' dispensing fee, but this will only 'encourage efficiency' by driving higher cost pharmacies into bankruptcy. If the negotiated fee is based on existing or forecast costs of dispensing under current modes of organization – which is inevitable – it can only serve to perpetuate those modes of organization. Moreover, since all dispensers benefit from negotiating higher fees, such a system will generally face uniform industry opinion and evidence that current (or higher) fees are justified by present costs [e.g., Manore (1975) arguing that rising costs of Canadian pharmacy operations must lead to accelerated increases in dispensing fees in future years]. Administrators will find it difficult, if not impossible, to enforce a policy of deliberately setting fees below present costs in anticipation of future benefits which a unified industry will declare illusory. The only administrative alternative, however, would be to impose direct regulations

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naturally such competition would be ineffective in any case. The reported experience of one US drug chain which increased its annual prescription sales by 30 per cent after initiating prescription price advertising is certainly consistent with price responsiveness of market shares ('Rx ads boost sales, says Courtesy,' Chain News, *Drug Topics,* 1 Oct. 1976). Finally, surveys studying the demand for health care which ask people about transportation and other transactions costs usually find that such costs are *perceived* to be relatively low (whether they are or not), and this argues against a high degree of spatial segmentation.

[10] Which may explain their appeal to health care providers.

on the industry to limit non-dispensing activities, to prohibit establishment of new pharmacies and to order out of existence present small scale pharmacies. These regulations of course form a package – limitations on non-dispensing activities can be sustained only by pharmacies whose dispensing activities expand; but the questionable legality, much less the political feasibility of such regulations, makes the whole notion absurd.

Moreover a partial regulatory approach would combine the worst of both worlds. Restrictions of the non-prescription retailing activities of pharmacies would in the short run and for a given number of pharmacies and pharmacists remove a significant part of the economic base of the industry. Gross margins from prescription sales alone would not cover the 'costs' of the presently over-inflated capacity of the industry. A regulatory agency would then face severe pressure to raise dispensing fees – simply in order to cover 'costs' – with the outcome that pharmacists continued to serve as part-time dispensers but pharmaceutical costs would rise to pay full-time incomes.

If excess pharmacist capacity is restricted from moving into non-prescription retailing, it will presumably find an outlet in expanded 'professional' or 'patient advisory' activities, or in efforts to achieve regulatory redefinition and expansion of the pharmacist's role to include some drugs and medications currently available over the counter. If OTC drugs can be converted to prescription, or at least to pharmacist-supervised sale, then the mark-ups on such drugs can be raised due to their reduced availability from non-pharmacy outlets and the resulting increases can be justified as increases in 'costs' because of the extra pharmacist time required for supervision. By this means, the gross margins available to support pharmacist excess capacity can be expanded.

Direct public provision is yet another alternative. In the context of a general reorganization of health care on the community health centre model, this has significant possibilities. The pharmacist as pharmacological specialist on the health team, working in a health centre setting, supervising dispensing aides, has obvious professional and economic appeal. Torrance (1972) has developed this theme for the Hastings Project – one would supply drugs free through such an outlet while using administrative controls to ensure efficient use of professional time. The result might be higher costs per prescription yet lower drug and health costs through significant gains in prescribing appropriateness – in general fewer drugs. It has been suggested that a good hospital pharmacist can pay for himself several times over in lowered ingredient costs, to say nothing of reduced drug interactions and adverse effects. But if retail pharmacy continues isolated from the rest of health care provision, direct public provision implies the setting up of government-owned, specialized dispensing centres, presumably large scale, making full use of aides and other efficiency-promoting innovations. But why?

To capture sufficient market share to support such operations, the public dispensing centres will have two options. Either they will have to price competitively with private community pharmacies, in which case we are back to the market mechanism approach with the addition of a public delivery system as well. In a delivery system already marked by overcapacity the advantages are not obvious. Alternatively the parallel private system could be regulated out of existence, either directly or by the device of providing insured drugs through the public outlet only. This has all the legal and political problems of administrative regulation, and adds to them the technical problem of ensuring maintenance of efficiency standards in the public system. Its attractiveness as a policy is underwhelming.

On balance, then, it appears that the policy alternatives to an expanded use of competitive market mechanisms are likely to be infeasible or inferior, with the possible exception of reorganizing dispensing in the context of an entirely reoriented health care delivery system. This is possible in the longer run, but is in no way inconsistent with the type of rationalization suggested here. Increased reliance on market forces can be combined with a partial drug insurance plan, as Saskatchewan has demonstrated, but a first-dollar universal plan amounts to *de facto* abandonment of rationalization and to the acceptance of the excessive costs of the existing dispensing system indefinitely. A partial plan with first-dollar coverage for a subset of the population, e.g., those over 65, or with a proportionate copayment by the purchaser of drugs, weakens the potential for rationalization by reducing the incentive of some or all drug buyers to respond to price differentials. A deductible plan would seem superior in this regard since all drug users will be exposed to price signals for some purchases. A flat $*x* per prescription plan is equivalent to first-dollar coverage in eliminating market incentives for rationalization.

IS RATIONALIZATION RATIONAL?

Implicit throughout the above discussion has been a particular definition of the 'product' of pharmacy – the service of dispensing a prescription. Using this definition of a product, pharmacy shows significant over-capacity, excess use of highly-trained manpower, and, in general, unnecessarily high costs of providing its 'product.' The apparent economic inconsistency of an industry of owner-managed, profit-oriented firms failing to cost-minimize by inappropriate choice of input mix and/or failure to adopt least-cost technology is addressed in chapter six, and traced to the important role of the variable implicit price of the owner's own labour as a component of cost, and to the very different demand elasticities at the individual firm and industry levels. But, as is generally true in the analysis of the health care economy, the exact definition of the 'product,' good or service, being produced by any branch of the health care delivery system is highly problematical; and conclusions concerning efficiency or inefficiency will depend critically on one's concept of the nature of the product being produced.

In the case of the dispensing of pharmaceuticals, it is clear that the 'dispensed drug' measure of output is incomplete in a number of specific respects, which for purposes of analysis can be organized under two main heads. First, are the circumstances surrounding the transaction which either yield additional utility to the purchaser or lower the costs of the transaction to him – what one might think of as convenience and ambience features. Transactions costs would include travel time (and costs) to the pharmacy or delivery costs or waiting time for prescription filling. Ambience features include the general pleasantness of the pharmacy setting, the opportunity to chat with the pharmacist or an attractive receptionist, the quality of the background music, etc. Secondly, the dispensing process may embody a professional component in which the patient is advised about the proper use of the drug, and/or the prescription is checked against the patient's past record or present condition for interactions, allergies, or contraindications. Again this professional component of the transaction may be subdivided conceptually into drug-related and patient-related advice, although of course the two will be combined in any actual setting. Drug-related advice can be characterized as specific to the preparation – e.g., aspirin should be taken with milk, tetracycline should not, tranquilizers or barbiturates do not mix well with alcohol, etc. Patient-related advice is specific to the therapy of the individual patient, and bears on the appropriateness of the prescribed drug to *this* patient at *this* time. By reference to the patient's drug record, or by questioning, a pharmacist could check for past allergies to the particular drug (which the patient might be unaware of since the same drug has numerous different names) or for interaction affects with other drugs currently in use whether prescribed or non-prescribed, or for the appropriateness of the dosage and its relation to patient symptoms. It is this final level of professional sophistication at which the 'New Role' of the pharmacist as pharmacological advisor to both patient and physician, and a member of the 'health care team' with unique and specialized knowledge, emerges and takes on specific content.

All these additional services surrounding the dispensing process have been disregarded in the above discussion of rationalization, and by implication they have been excluded from the 'product' definition. Rationalization of the dispensing function implies that dispensaries will indeed be fewer and larger, and hence patient travel times will rise. Queuing times may rise somewhat if pharmacists have less idle time, and a cost-conscious dispensary may be somewhat more spartan physically. At the same time the pharmacist who is employed full-time rather than part-time as a dispenser will have less time to spend in advisory roles. A major source of pressure for the pharmaceutical 'New Role' undoubtedly arises because pharmacists have time on their hands and because of the low and unsatisfactory professional content of 'counting and pouring.' As dispensing becomes a full-time function with more supervisory content, it necessarily cuts into time available for patient advisory functions. The economic gains associated with rationalizing the dispensing function may thus come at the price of reducing both the 'convenience/ambience' and the 'professional' features of the transaction and the extent of this cost deserves some attention.

Focusing first on the convenience aspect, of which a prototype might be the additional travel time incurred by the patient when pharmacies are fewer and larger,[11] highlights the strength of market-type mechanisms of rationalization over administrative or direct public provision approaches. What distinguishes convenience from professional features is precisely that in this area we can and should allow the consumer's free choice to function and express itself through willingness or unwillingness to pay. If consumers value access to small, community pharmacies and/or pharmacies where the proprietor sells Kleenex and chats with his customers, then they will be willing to pay, and should pay, for such access. A system of independently determined and freely advertised dispensing fees, paid by consumers, will not in fact lead to all dispensing being concentrated in a much smaller number of large dispensaries, but a multi-level market will develop with low-cost mass dispensaries and higher-priced community stores – if that is what consumers want. Since the non-dispensing convenience features such as proximity relate to consumer utility but not health, then there is no social justification for interfering with consumers' decisions about whether or not to pay for them. If small higher-cost dispensaries all become consolidated over time into fewer and larger ones, it will indicate that consumers do not value the extra services of higher-cost stores enough to support their costs. And if consumers do not value such services, then they should not be supplied.[12]

[11] Night and holiday hours are also a component of access costs; clearly the population required to support an efficient-scale *all-night* pharmacy is much larger than that required to support an efficient scale single- or two-shift pharmacy. But off-hours drug needs in smaller communities are probably best integrated into the hospital system, where a round-the-clock institution is already in operation, rather than served by maintaining excess dispensing capacity with inflated prescription prices.

[12] It may be argued that fewer and larger outlets will act like monopolists and drive up prices if small stores disappear. But the problem is that collusive restraints on competitive behaviour are holding up price *now!* There is no reason to expect them to get worse. Moreover, a tripling of output per pharmacist would still require one pharmacist per 5500-6000 people, and most of Ontario's population lives in urban areas able to

Rationalization may, however, impose transfer costs on a sub-set of prescription buyers, the intramarginal users, who may value convenience enough to pay the extra costs but who may be so small a part of the market that their purchases will not support a neighbourhood dispensary. For such users, rationalization involves transfer costs, just as it confers transfer benefits on energetic shoppers who already travel to large dispensaries for presently relatively small price reductions. Such a pattern of implicit transfers may or may not be a problem. If the losers are the relatively wealthy who place a high implicit value on their own time, one could disregard the issue. If the elderly and ill are those who chiefly value convenience, rationalization imposes transfer losses on a group which generally one intends to subsidize. But this problem, though real, is an absurdly slim justification for preserving the existing dispensing system with its large over-capacity – still less for putting a pharmacy on every block! The obvious answer is delivery services, which were estimated by the Commission on Pharmaceutical Services in the mid-60s from five different studies in different provinces, to run from a low of 4 cents to 5 cents per prescription to a high of 10 cents to 23 cents. Even assuming a doubling of the highest of these high estimates by 1975, one could provide free delivery to all prescription buyers for 46 cents per prescription – less than the lowest estimate (58 cents per prescription) of the excess costs of the present delivery system. For the small proportion of the population whose mobility is limited and who value convenience, a delivery system based on larger dispensaries will provide more convenient service, at lower cost, then a neighbourhood system – even if the user pays the delivery charge. Cady's (1975) finding that at present in the US larger pharmacies are less likely to provide delivery services at all is no controversion of this approach, since the prescription market is presumably already segregated such that their users are those who place a lower value on that dimension of convenience. If a significant shift from community pharmacies took place in response to dispensing fee differentials, larger dispensaries would find delivery services worthwhile.

It follows then that convenience-type services associated with dispensing may or may not be of enough value to the consumer to justify their continuance, but if rationalization takes place through competitive market mechanisms consumers

support numbers of such large-scale dispensaries. As for the people in very small communities, part of the accepted cost of living in a small community is the necessity of travelling longer distances (though not necessarily longer times) for all sorts of goods and services – it is offset by other advantages or else people would not live there. If small town dwellers value proximity enough to pay for it, small town pharmacies will be smaller and charge higher dispensing fees. If not, the residents will travel a bit farther.

will have the opportunity to indicate their value. As for professional services, their justification must lie elsewhere. In essence, an argument against rationalization on professional grounds says not only that the professional component is important to the health of drug users but that it is important enough to justify the costs of excess capacity, and furthermore that consumers must be *forced* to accept such services. This appears a bit blunt, but imposing restrictions on the dispensing process either by legislation or by legally binding ethical requirements for licensure imposed by pharmacy associations amounts to denying consumers the choice between higher dispensing fees with professional services, and lower dispensing fees without. In this sense, consumers are forced to take the higher-priced package, or do without. Such legislative or quasi-legislative interference and its associated excess capacity and drug costs *may* be justifiable in terms of the need to protect the patient against himself, it is after all a common argument by all health care providers. But any such interference deserves specific scrutiny; it should not be assumed to follow automatically from a loose equation that drugs have to do with health, and all sorts of interferences with consumer choice already take place in health care, so why not one more? Scrutiny is particularly important when it is clear that the providers of dispensing services, being underutilized, overtrained, and in surplus, have a very strong incentive to add professional advisory services to their 'product line' – and charge for them. As suggested by Tuohy and Wolfson (1976) in their study of professionalism, by Torrance (1972), and by the data assembled in the US by the Federal Trade Commission (1974, 1975), the new professional advisory role arises from the decay of the old professional compounding role and responds to important economic and professional needs of pharmacists. Whether it can produce corresponding benefits for the public is another question.

The issue is highlighted by the patient prescription record, which provides in principle a method whereby patient drug allergies and interactions can be maintained and monitored – *if* the patient always uses the same pharmacy, and *if* the pharmacist actually uses the record. Advertisements for such record-keeping systems aimed at pharmacists strike a very different note – 'She'll never price-shop if you remember Jimmy's allergies' (Safeguard Business Systems Ltd, *C. Pharm. J.*, vol. 107, no. 9, Sept. 1974), 'The family Rx record plan ... the business builder' (Systems Equipment Ltd, *C. Pharm. J.*, vol. 106, no. 2, Feb. 1973) – and others. These emphasize the role of patient record plans as ways of reducing the price-sensitivity of shoppers and attracting and holding customers to a particular retailer – in short, as advertising. Unless the marketers of such systems are incompetent, we may assume that their own advertising is aimed at the motives which will in fact lead the pharmacist to install such systems.

But motives are rarely simple, and the concurrence of motives of private self-interest with public benefit is part of the stock-in-trade of market economics. Even if pharmacists promote 'professional services' to maintain or expand their businesses and justify reimbursement at 'professional' rates for retailing services, one cannot for that reason rule out the possibility of significant public benefit from the professional component of dispensing. In fact the present widespread concern over inappropriate prescribing in the most general terms – too many drugs used, of the wrong kind, in the wrong combinations, suggests an important social role for the pharmacological advisor to the health care team in lowering drug costs and improving the quality of chemotherapy. But there is no evidence that pharmacists at present play this role to a significant degree, or that they can in future. As Torrance (1972) puts it: 'The pity of the pharmacist's role in the present system is that pharmacists *could* be an active, positive, influence with regard to both the cost and therapeutic rationality aspects of the drug problem but at the moment factors built into the legal, social, and economic framework of practice systematically discourage such action.'

Surveys reported by the Commission on Pharmaceutical Services and discussed by Torrance show that the professional role at that time was small – about seventy per cent of pharmacists reported that they received notice of five or fewer patient adverse reactions per month, over a third checked no prescription errors with the physician in a month and nearly half checked between one and five – so the 'professional' component of dispensing was clearly a recommendation for the future. But how serious a recommendation? A pharmacist at present is paid for dispensing drugs – not for not dispensing them. And yet a serious effort to play an advisory role would involve primarily recommending against particular prescriptions. This is true not only because currently over-prescribing is more of a problem than under-prescribing, but also for the obvious reason that even if over- and under-prescribing errors by physicians were evenly balanced, those who should have a prescription but do not will not see a pharmacist! Thus the pharmacist in community practice who emphasizes the professional role will spend more time per prescription, dispense fewer prescriptions, and earn less, than the pharmacist who simply dispenses – regardless of whether or not the dispensing fee is set high enough to support a professional role. Hence the suggestion by Chiles (1975) that fee-per-patient replace fee-per-prescription to circumvent the perverse incentives of the existing system. Chiles' capitation plan, however, presupposes some form of larger health care entity and logically leads back to Torrance's argument that only a community health centre, hospital, or other institutional setting will permit the pharmacist to act as a professional advisor without incurring direct economic penalties.

But the penalties are not only direct. The assumption of a professional advisory role which is specific to the patient (as opposed to one which simply describes drug characteristics) presupposes that physician prescribing is less than wholly adequate. This may be a reasonable presumption. But a pharmacist who makes a practice of questioning physicians' prescriptions and revising or cancelling them, is embarking on a very risky professional career. The jealousy with which physicians guard their relationship with 'their' patients against encroachments by other non-physician professionals is well-known. And it is not difficult for physicians to steer patients away from a pharmacist who has embarrassed them. The answer to this problem appears to be the establishment of a collegial relationship of mutual trust such that physicians accept the pharmacist as a consultant prior to the patient receiving a prescription, but the present fragmented, entrepreneurial system of both medical and pharmaceutical practice makes this virtually impossible.

And behind the physician is the drug manufacturer, a purely profit-oriented enterprise. If the pharmacist's professional advice reduces drug sales, regardless of its impact on therapy, the manufacturer suffers. The attitude of the manufacturer toward drug over-use may be epitomized by Henry Gadsden of Merck, whose dream is to produce 'healthy-people products' that everyone can take ('Merck strains to keep the pots aboiling,' *Fortune*, March 1976). Logical enough – for a profit-maximizing company, no sales, no profits. But it means that manufacturers can be relied upon to resist efforts by community pharmacists to play any professional role which threatens to impede the steady flow of products across counters. And such resistance is not only direct, but indirect through the huge investment which manufacturers have made in advertising to physicians. The same journals, mailings, and detail men who attempt to sway physicians' prescribing choices can sensitize them to any threat to their professional autonomy – if sensitization were needed.

Thus the big battalions of health care are ranged against any effort by the self-employed community pharmacist to play a serious professional role in drug therapy – even if he/she were professional enough to rise above the built-in economic disincentives to do so. The community pharmacist at present fails to play this role (what Torrance calls 'sins of omission') not from laziness but because he/she cannot and in this situation will not change unless the structure of medical and pharmaceutical practice changes too. Faced with this dilemma, we may expect that the 'new role' of the pharmacist will find expression in drug-related rather than patient-related advice – basically an extension of the labelling process – which does not involve either trespassing on the physician's turf or interfering with the manufacturer's drug sales. It also does not require a degree in pharmacy, and for that matter could probably be conveyed as well by a printed flyer specific to each pre-packaged drug, saying, e.g., take aspirins with milk. A pharmacist could say more, but in general does not, and will not. Such a 'professional' role uses up time and has high public visibility, thus meeting the requirements of the pharmacist to be seen to be 'professional,' but it is not clear that it constitutes a contribution to the health of the public sufficient to justify forcing drug consumers to pay for it. There will of course be exceptions to this generalization, as pharmacists struggle to reconcile the increasing professionalization of their training with the constraints imposed by the realities of community pharmacy. But it does not appear that a new role in this context can hope to be much more than cosmetic. And in fact if a genuine new role emerges in institutionally-based, health team pharmacy, most of the dispensing function will be delegated to aides anyway while managerial functions will devolve to managers. Thus the only settings where a new professional role has any hope of being meaningful will still reduce the need for pharmacists.

THE REST OF THE DELIVERY SYSTEM: PRESCRIBING, MANUFACTURING, AND WHOLESALING

Down to this point the discussion of the drug delivery system has focused exclusively on the dispensing process because this is the principal point of contact of any pharmaceutical insurance plan. The dispensing process, however, accounts for only about half the total cost of an average prescription; the other half being the costs associated with putting the drug on the pharmacist's shelves. Most of the literature and the criticism directed at the drug industry over the last twenty years has been directed at this stage of the process, with debate focusing on whether manufacturers' prices of drugs were too high, and whether correspondingly profits and marketing expenses by drug manufacturers were inflated. And probably the most important component of the whole drug delivery system, the prescribing activity of physicians, is not directly reflected in the price of drugs at all since it affects volumes used, not (except indirectly) average prices. Yet the right drug at the right time may be worth far more than its price to the patient, and conversely the wrong drug is worth far less. The appropriateness of the drugs actually prescribed may ultimately be a better measure of the efficiency of a drug delivery system, therapeutically or economically, than the prices paid either wholesale or retail for drugs. But it is of course more difficult to quantify 'appropriateness,' since (with the exception of demonstrably ineffective or harmful drugs) appropriate prescribing is not a characteristic of a drug but a relation between a particular drug and a particular patient. One of the important benefits which can flow from a drug insurance plan is the possibility of generating extensive data on drug use by patients and prescribing by physicians, which can be used to monitor utilization.[13]

Given the importance of the manufacturing and prescribing components of drug delivery, economic and otherwise, the relatively limited space allocated to their discussion deserves some explanation. In the first place, the two are inextricably linked in the sense that much of the criticism directed at drug manufacturers relates to the very powerful role they play in influencing the prescribing process. Torrance (1972), Liefmann-Keil (1974), Silverman and Lee (1974), Kawakami (1974) all stress this relationship, but the point has been made many times before that while patients pay for drugs, physicians determine their demand. The marketing efforts of drug manufacturers are therefore directed at influencing physician decisions to prescribe a particular drug. Such advertisements as may be directed at the public at large are generally intended merely to induce a positive attitude toward drugs or to serve a political purpose in discouraging regulation, and are correspondingly often jointly sponsored without identifying a particular manufacturer. Thus any policy affecting either one of industry marketing strategy or prescribing behaviour of physicians would automatically influence the other.

Moreover, there is really less to be said, on the basis of existing data, about either manufacturing or prescribing in Canada. Data on the cost structure of Canadian drug manufacturers are somewhat suspect because the large foreign-owned companies which form the backbone of the industry essentially determine that cost structure through their transfer pricing decisions. Large multinational corporations can choose the prices at which they will make raw materials available to their subsidiaries, or the royalty rates or other charges which will be imposed, such that costs and profits in the subsidiary are at least within a range discretionary. If, to take a far-fetched example, a nation-wide Canadian pharmaceutical insurance plan were introduced, with first-dollar full coverage, and no constraints on utilization and pricing, one would expect drug prices at the manufacturing level to rise rapidly due to 'increasing costs' of acquiring raw materials from foreign sources. For political reasons, Canadian subsidiaries' profits would probably stay low; but for economic reasons 'costs' would certainly rise and higher profits would emerge in some other arm of the multinational enterprise. Any other behaviour would be irrational and inconsistent with profit-maximization by the shareholder-owned private firm. As for the prescribing process, in the absence of an insurance program data on who is using what are available only through sampling of pharmacy prescription records. Such data collection is carried out on a private basis as part of the drug marketing process, but the information is not public and the objectives of users of such information are of course the expansion of sales of particular drugs. The appropriateness of such sales is irrelevant.

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[13] Such monitoring is, of course, a useless exercise unless the information it generates can be matched against drug utilization standards, and unless mechanisms exist to influence patterns of utilization if they are found to be inappropriate.

One theme which has emerged and formed the focus of all discussions of drug manufacture, however, is the very wide variation in manufacturers' prices. The same drug sold to different buyers, or sold under different labels by different manufacturers, or sold in lots of different quantities, may show variations in price of hundreds of per cent. Correspondingly, when estimates of manufacturing costs are developed, similar spreads show up between costs of manufacture and selling price. Drug buyers such as hospitals or groups of hospitals which purchase on a competitive bidding basis do realize significant savings on ingredient costs. This suggests that a provincial drug insurance plan which included some mechanisms to offset the market power of the large drug manufacturers could lower significantly the ingredient costs of the drugs paid for by that program. But one cannot generalize the quantitative savings attainable on a particular drug, or the average savings achieved by a particular purchaser, to yield an estimate of system-wide savings at the level of a large province. Large price differentials may emerge for several reasons in a segmented market, such that the lowest prices would be unsustainable in a uniform market.

The most obvious limitations are conventionally illustrated in price theory by the profit-maximizing monopolist selling in multiple markets which are fully or partially insulated from each other. If demand elasticities differ across markets, in general profit maximization will lead to multiple prices. Thus one would expect a drug manufacturer to charge a high price for a drug sold on the retail prescription market while providing the same compound at much lower prices when bidding on competitive bulk contracts. Such price spreads will be particularly marked if marginal production costs are much below average costs, i.e., in industries with a large fixed cost or overhead component in their cost structure. This appears to be pre-eminently the case in drugs, where research, but more particularly advertising and marketing expenses, take up an unusually high proportion of the sales dollar. The actual production costs of a drug are relatively low, though if the drug is acquired from an international parent the transfer price may include indirect payments for the research or advertising activity of the parent. In such an industry the allocation of overhead costs (which is an arbitrary process at best) will be carried out such that the market with relatively inelastic demand bears most of the overhead as well as generating most of the monopolist's rents. Hence one cannot conclude that the whole of the price differential on a given drug between two markets represents monopoly rent. The particular market segment(s) which has the privilege of paying for the manufacturer's overhead will be chosen on the basis of the relative demand elasticities; but overhead costs must eventually be funded somewhere if the firm is to continue in business. (Not all such costs, though; clearly the level of marketing overhead has a high discretionary component.) The same principle holds true across different types of drugs; obviously the mark-up of selling price over costs will be much higher for those with relatively inelastic demands as the manufacturer recoups a relatively larger proportion of both overhead costs and monopoly rents from the more protected brands.

It does not follow, of course, that purchasers of drugs at lower prices, e.g., hospitals, are being subsidized by the ambulatory patient who buys from a community pharmacy merely because the latter pays a higher price. So long as the low-price buyer pays a price equal to or greater than the marginal cost of the drugs bought, a price which as noted will typically be much lower than average cost due to the large fixed-cost component of drug manufacturing but also due to the relatively large profits which are generated in drug manufacturing, then the price paid by the pharmacy customer is not increased. If the competitive, institutional buyer withdrew from the market, the price paid by the community pharmacy customer would not fall.[14]

It is true, that if by regulation the practice of price discrimination were (or could be) forbidden, the prices in the two markets would tend to equalize at an intermediate level. The situation is depicted in Figure 2, showing demand and marginal revenue curves faced by a monopoly seller of a drug in two segregated markets, A, relatively inelastic demand, and B, relatively elastic demand, with a constant marginal cost of production. The profit maximizing solution is to charge P_A in market A and P_B in market B, selling a total quantity determined where the sum of the marginal revenue curves in the separate markets, $\mathrm{MR}_A + \mathrm{MR}_B$, is equated to the aggregate marginal curve MC. At this output level, Q_{A+B} divided into the amounts Q_A and Q_B sold in the separate markets, the marginal cost of the last unit of output produced is equated to the extra revenue it could bring in in either market. Clearly $P_A > P_B$, but equally clearly if market B did not exist, the profit-maximizing price in market A would still be P_A. Buyers in market A are not subsidizing those in B in the sense of paying a higher price to support B. On the other hand, if price discrimination were disallowed the seller

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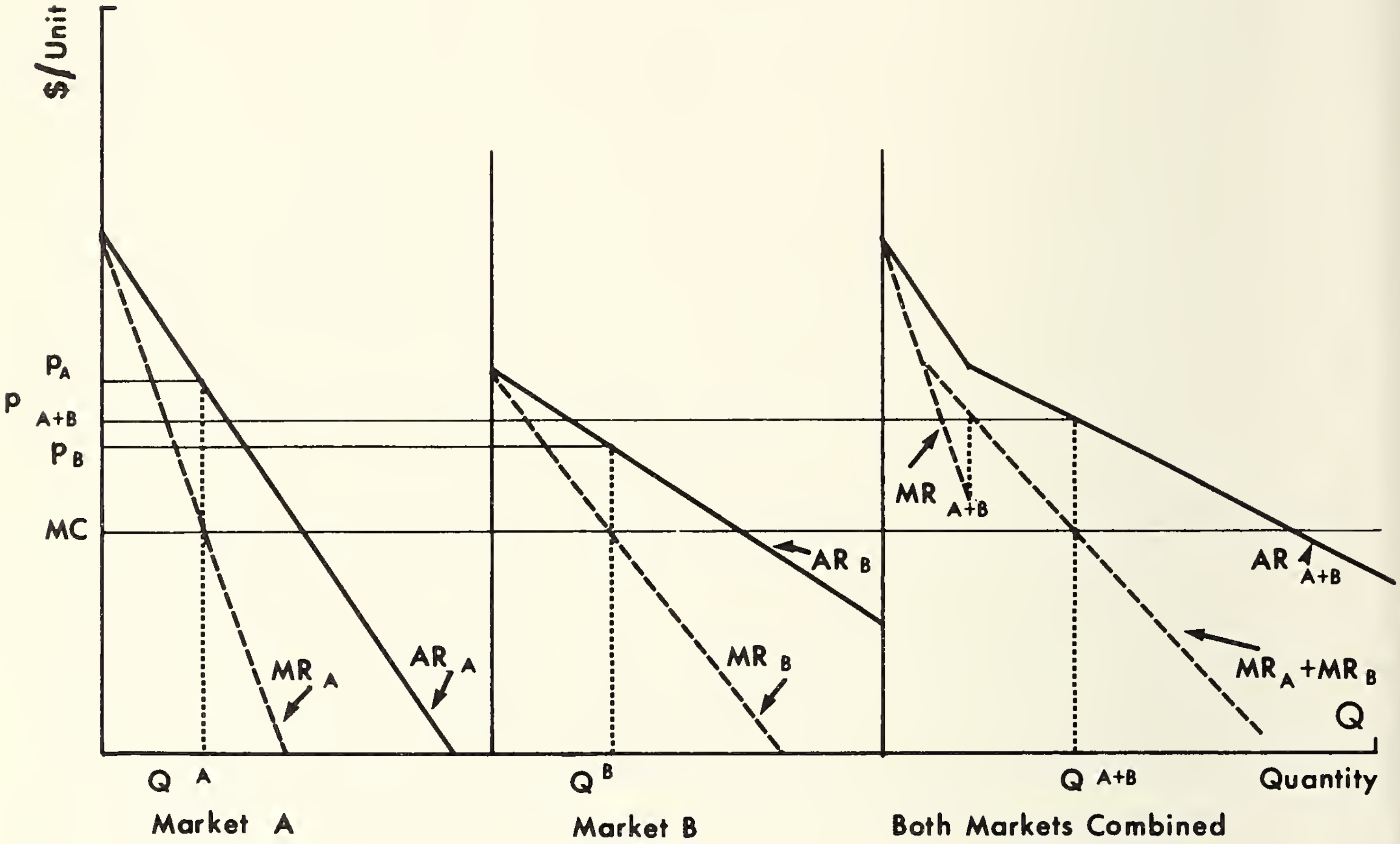
[14] Assuming, of course, a long-run constant marginal cost for the manufacture of existing known drugs – which seems plausible.

Figure 2
Price and quantity determination by a profit-maximizing monopolist selling a drug in segregated markets, with and without price discrimination.



would now face an aggregate demand curve, AR$_{A+B}$, in an aggregate market. The marginal revenue curve derivative from it would be discontinuous, of the form MR$_{A+B}$, and would contain the sharp dip and discontinuity shown in the third panel, rather than the kinked but continuous MR$_A$ + MR$_B$. As drawn, the monopolist will continue to produce Q_{A+B} but now he will charge the intermediate price P_{A+B} derived from the aggregate demand curve, AR$_{A+B}$, which did not exist when the markets were segmented. If on the other hand, the discontinuity were such as to intersect the MC curve, the manufacturer might give up sales in the elastic market altogether because such activity forces down his aggregate price and reduces the profits he can earn in the inelastic market. It is clear that the retailers in market *A*, in this case community pharmacists, would benefit from such a change because prices fall and sales (and retail margins) rise in market *A*. Manufacturers and buyers in market *B* clearly lose. But whether one wishes to assert that in the regulated case buyers in *B* 'subsidize' those in *A*, or in the unregulated case buyers in *A* 'subsidize' those in *B*, is a question of semantics. Both sets of buyers could be made better off by policies to reduce the monopoly power of the seller and hence the spread between marginal cost and any of the retail prices shown.

There is, however, a clear case in which low cost buyers are subsidized by high cost if drugs are supplied below marginal (*not* full!) cost for advertising purposes. If a manufacturer supplies drugs cheaply or free to a hospital to imprint the brand names on the consciousness of student physicians, the discrepancy between production cost and price is a marketing expense which will have to be recouped from sales in other markets and generally will be recouped in the less demand-elastic market of community pharmacy. In a static sense, the presently low-priced or free hospital drugs are being paid for by higher-priced pharmacy drugs, but in a dynamic sense the low-priced drugs now are intended to give rise to more sales of the higher-priced community pharmacy drugs later when the hospital-based student physicians move out into community practice. The parallel is of course with free sample drugs to physicians. What must be stressed, however, is that this sort of marketing strategy represents a subsidy, in the sense of an additional charge on drugs bought through the community pharmacy, only if the lower-priced drugs are sold below their *marginal* production cost, which typically will be far below their average price to the pharmacy. The mere existence of a price differential is no evidence of a subsidy. Nevertheless, regulatory suppression of that differential is clearly to the economic advantage of community pharmacists.

It appears, then, that the potential savings which a public program might achieve in drug ingredient costs cannot be derived from the direct observation of existing market differentials. An alternative route is to consider the drug manufacturer's sales dollar. If this is split roughly into costs of production, research, marketing, and profit, any savings to be achieved by a public policy must be extracted from one of these components. Again it must be emphasized, however, that in a Canadian province reported data on the division of sales by such components will be discretionary since costs of production in subsidiaries of foreign firms depend on ingredient transfer prices from the foreign parent. This will embody an indeterminate amount of profit, research, and marketing expense at the international level. Subject to this *caveat*, however, it seems fair to suggest that there is no *a priori* reason to expect potential economies in production costs. The strong cost-reducing incentives generated by the profit-maximizing objectives of private drug manufacturers suggest that the actual mechanics of producing drugs are probably carried out with great efficiency. At the very least there is no reason to suppose that a public enterprise, lacking such incentives as well as experience, know-how, and scale, could do better. One may question the particular choice of drugs to be manufactured, but that is another issue.

The profit component is an ever-popular target of criticism, as drug manufacturers have enjoyed remarkable good fortune relative to industries in general in maintaining their status at or near the top of all industries in profit rates. (Again, whether the accounting practices of a particular group of Canadian wholly-owned subsidiaries shows these results is irrelevant.) The various mechanisms whereby the large drug manufacturers maintain entry barriers and protect or extend their market power have been widely studied (e.g., Walker, 1971) and do not need further comment here. What is relevant, however, is that the quantitative significance of such excess profits *in themselves* may not be all that great. (The quantitative effects of the strategies required to generate such profits is of course another matter.) Silverman and Lee report that profits as a percentage of net shareholder equity in US drug manufacturing from 1960 to 1972 ran between 50.8 and 99.0 per cent above the average for all manufacturing, averaging 69.6 per cent above.[15] Moreover they were substantially less variable, the lowest year (16.7 per cent in 1966), being 80.3 per cent of the highest (20.8 per cent in 1961 and 1962) while the average for all industries ran from a low of 8.9 per cent which is 65.4 per cent of the high of 13.6 per cent. This illustrates a point which they make, that while the development of any given drug may be very risky, the drug manufacturing industry as a whole is not. Keeping in mind that their averages exclude such highly profitable non-US firms as Hoffman-LaRoche and CIBA-Geigy, and that the all-industry US average includes firms with a significant amount of market power as well as competitive industries, an estimate of 50-75 per cent for the amount by which US industry profits are increased due to market power seems reasonable. Between a third and 40 per cent of such profits may represent economic rent – a wealth transfer to industry shareholders from US drug users.[16]

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[15] Apart from the claim that pharmaceutical manufacturing requires high profits to draw capital into high-risk research activity, which appears false, pharmaceutical industry spokesmen have pointed out that conventional accounting overstates their profit rates because their large marketing and research expenses are really a form of investment. If the capitalized and depreciated value of such intangible investments were added to the capital base of their firms, reported profit rates would fall. This is certainly true; since profit rates are a ratio of net revenue to total assets, then treatment of intangibles as investments would require that they be added to total assets and the ratio would thus tend to be reduced. On the other hand, reported net revenue would rise because, instead of expensing intangibles in the year of occurrence, the firm would be able to deduct (for tax purposes) only estimated 'depreciation' of intangible investments. Present treatment of intangibles amounts to assuming instant depreciation, which leads to minimum taxable profits but maximum reported profit rates. At the other limit, if intangibles were an asset which never depreciated then no part of intangible investment could be excluded from profits for tax purposes; but over time 'assets' would grow without limit due to the ever accumulating 'intangible' component. Reported profit rates could be made indefinitely small. For intermediate rates of depreciation (between instantaneous and zero) the accumulation of intangible assets will increase in the denominator of the profit rate ratio until 'depreciation' on this sum just equals annual expenditure; at this point reported profits will be back to their previous level (since the equivalent of annual intangible expense is being written off as depreciation on the 'stock' of intangibles). But the total asset 'stock' will now be higher and so profit rates will be lower. Of course there is little ground for choosing any particular depreciation rate and for comparison with other industries the same adjustments would be necessary to their reported profit rates as well. The issue is of course yet more complicated if growth in firm sales is introduced, or worse yet made dependent on rates of investment in intangibles. With a little ingenuity the basic issue can be completely obscured. Nevertheless, if drug manufacturers expense marketing costs for tax purposes (and reversal of this policy has not, apparently, been suggested) it seems a bit inconsistent (though perfectly understandable) to try to reanimate such expenses as capital for purposes of computing profit rates.

As a percentage of sales, however, net profits in the US drug industry run around 10 per cent. Silverman and Lee report a low of 9.1 per cent and a high of 11.0 per cent from 1960 to 1972; going back to 1952 yields a high of 11.9 per cent and a low (in 1953) of 8.1 per cent. Hence a reduction by 40 per cent in profits (*ceteris paribus*) would imply only a 4 per cent reduction in sales. Since ingredient costs amount to about half of prescription prices, this implies a potential drop of only 2 per cent in prescription prices.

Similar data for Canada were provided in the report of the Harley Committee (1967) which while not as recent tend to paint the same picture. That Committee found that from 1953 to 1963 the Canadian pharmaceutical industry averaged a rate of return on invested capital of 19.71 per cent, 89.5 per cent above the all-industry average of 10.40 per cent. On resources employed (owned or borrowed) the rates were 13.77 per cent and 7.42 per cent or an 85.6 per cent advantage. However the Committee also separated out human pharmaceuticals from drugs generally, and estimated that for this subset of industry sales, net profits as a percentage of sales were 15.0 per cent rather than 10.8 per cent (1964). The rate of return on assets employed in producing human pharmaceuticals is correspondingly higher as well; the Committee calculated that net return on resources employed was 21.1 per cent (again 1964) for human pharmaceuticals compared with 15.6 per cent for drug manufacturers in the PMAC, and about 7.5 per cent for all manufacturing.

Moreover the Harley Committee addressed the problem of transfer pricing and concluded (p. 71):

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[16] In this context it should be recalled that drug prices charged by international firms tend to be higher in Canada and the US than in the rest of the world. Hence profit rates computed for a multinational, whether US or foreign-based, are probably higher on Canadian sales than on the total of all world sales.

> With respect to the prices paid for raw materials purchased from parent companies, there is little before this committee to indicate what degree of diversion of profits may take place and therefore it is not possible to estimate what this 'understatement of profit' may amount to for the Canadian drug manufacturing industry. However one is inclined to believe that it probably occurs due to the lack of operation of free market conditions in dealings between parent and subsidiary.

They then went on to note that explicit payments for foreign royalties and management services were quite significant, that for human pharmaceuticals the rate of profit on total resources employed net of royalties and management services was 24.5 per cent or 27.4 per cent (depending on assumption) compared with 7.5 per cent for all Canadian industries.

The Harley Committee data are elderly. Still, the Silverman-Lee data do not show marked changes in any key US ratio since the early or mid-sixties. Since their base data are similar to Harley's, it seems fair to mark up the profit estimates for human pharmaceuticals to 15 per cent of sales rather than 10 per cent. And an estimate that half of net profit on human pharmaceuticals represents economic rent, in the sense of returns over and above the general rate of return on invested capital in relatively low-risk industries, looks conservative. Since that Committee report, changes in Canadian legislation with respect particularly to compulsory licensure and importing of competitive drugs may well have lowered drug industry profits somewhat, but one would expect the principal impact of such legislation to be on the already more competitive hospital and institutional market. Given the relatively limited incentives to physicians to respond to drug prices in prescribing for ambulatory patients, combined with the recent extension of public drug insurance programs, it is doubtful that the supply of pharmaceuticals to community pharmacies has become more competitive as a result.

Thus adjusting the Silverman-Lee estimates to human pharmaceuticals only, and allowing for some profit component in parent to subsidiary transfer pricing, we can raise estimated pharmaceutical profits to 15 per cent of sales, and to a ratio of 2-3 times corresponding industry average profit rates. (The highest estimate of profit rates, net of royalties, etc., provided by Harley is 27.5 per cent for drugs versus 7.5 per cent for all other or 267 per cent higher). On these assumptions, 7½-10 per cent of ingredient costs represent excess profits or economic rent returns to the market power of drug manufacturers. This translates, however, into 4-5 per cent of prescription prices – not by any means a trivial sum but not staggeringly large either when judged against the probable errors in utilization estimation inevitable in any new program. If a universal pharmacare program in Ontario cost $300 million annually, this estimate says that $12-15 million of this amount would be excess profits of drug manufacturers.

More important, quantitatively, are the potential savings to be achieved by reducing the very extensive marketing efforts of the drug manufacturers. Such a reduction has potential indirect gains in reducing the over-utilization of drugs and the biases in the prescribing process, as well as direct savings from reduced drug costs. In this context, it is difficult to draw a sharp line between marketing and research. Clearly all research is in the end aimed at a market. But is the development of patentable and marketable substitutes for well-known products 'research' in the same sense as the search for new therapeutic agents? The production of combination products or the struggle for new ways to package and sell acetylsalicylic acid become lumped into 'research.'

For these two components, Silverman and Lee report that (in 1972) the US industry spent 20.0 per cent of US sales on promotion, and that on a world-wide basis US-owned firms spend 9.0 per cent on research. They also show a steady increase in the research proportion; in 1964 it was 8.0 per cent comparing with 7 per cent reported by the Harley Committee for Canada in that year. Silverman/Lee's data show an apparent structural shift in this percentage, for the US, in the late fifties and early sixties when it rose from 5.0 per cent in 1956 to 6.4 per cent in 1958 and 7.8 per cent in 1961, jumping 2 per cent from 5.2 per cent to 7.2 per cent in the two years 1957-9. It reached 8.8 per cent in 1967 and has been more or less stable since. But these data refer to all drug sales, human and veterinary, bulk and unit dosage forms. The Harley Committee in Canada estimated, for the large drug manufacturers making up the PMAC, a ratio of about 30 per cent of sales devoted to promotion. This is probably high for the industry as a whole; smaller firms relying more on competitive bulk sales have lower advertising costs. Moving in the other direction, however, almost all these promotional costs are incurred with respect to human pharmaceuticals – the extensive network of field representatives, direct mail, free samples, and medical journal advertising aimed at physicians. Thus the proportion of the sales dollar from human pharmaceuticals purchased through community pharmacies which is diverted to marketing and promotional expenses is probably understated by the aggregate figures. Raising the Silverman-Lee estimate to 25 per cent to allow for this effect would yield an estimate of 25-30 per cent of drug ingredient cost, and correspondingly 12½-15 per cent of prescription drug prices, accounted for by these activities. Hence any pharmaceutical plan which embodies methods of drug acquisition which bypasses this exceptionally expensive direct selling mechanism has the potential to reduce costs by this order of magnitude, in addition to gains resulting from lowering the economic rent component of manufacturing profit. Total potential savings are thus of the order of a third to 40 per cent of drug ingredient costs, or 16.7-20 per cent of prescription prices.

In principle, there are a number of ways in which one might hope to structure an insurance plan so as to generate these savings. In fact, however, the choices turn out to be comparatively limited. The essence of the public agency's problem is to build into the drug acquisition process a degree of price sensitivity; in this sense it is the inverse of the drug manufacturers' marketing problem which is to reduce that price sensitivity as much as possible. The bulk tendering, purchasing process indicates that when sales are made dependent on relative prices, manufacturers can and do reduce prices dramatically. But the present structure of the drug delivery system which supplies community pharmacies, as several commentators have pointed out, has developed as a fairly sophisticated structure to ensure that such price sensitivity will not develop in that sector. None of the actual or potential decision-makers involved – physician, patient, or pharmacist – brings together into the purchase decision information on *both* the effectiveness of a given drug relative to its alternatives *and* the relative cost of that drug compared to the same alternatives. As pharmaceutical insurance expands, the attenuation of decision-making information will become even worse as all parties to the individual drug transaction lose interest in specific prices and costs. Hence rational drug choice decisions taking account of relative prices cannot be made, as there is no decision-maker with either the information or the economic incentive to make them.

One may try to rectify the situation in several ways, each representing a different choice of locus for decision-making responsibility. The PARCOST approach, for example, attempts to locate that responsibility with the physician by providing him/her with price information on different drugs, guaranteeing quality, and hoping that the physician will choose the lowest cost drug for the patient. Alternatively one could, as some provinces have done, amend pharmacy legislation to permit pharmacists to substitute one generically equivalent drug for another, and thus hope that they will choose the lowest price on the patient's behalf. Finally one could in theory try to inform patients about the characteristics of different drugs and dismantle the legal structure of prescriptions such that patients could choose their own drugs, and at the same time relax all legal restraints on drug supply. Each of these approaches represents a different way of trying to combine the relevant information necessary for rational choice in a single decision-maker. Each, however, is notably defective.

The patient-centred approach appears an obvious non-starter. The widespread concern that physicians are inadequately informed about the characteristics and effects of drugs suggests that the possibility of patients becoming sufficiently informed as to be able to make their own choices is implausibly remote. As the power, diversity, and complexity of the range of chemical and biological agents available grows, the independent decision-making power of the patient inevitably shrinks with respect to *the choice of particular drugs*. This does not, of course, imply that the patient should not retain a right to know what drugs he/she is taking, what they may be expected to do or not do, and what the therapeutic options may be. But the responsibility for choice of specific agents or of specific brands can hardly be devolved back to the patient.

The PARCOST approach, on the other hand, has a significant advantage. It does not require any change in the present role of the physician as prescriber. The choice of drug remains firmly in the physician's hands, and the only change is that the physician is given additional information about drug prices on which to base the choice of prescription. It is the only strategy for increasing the price sensitivity of the drug choice process which has this characteristic – all others involve some limitation or modification of the physician's prescribing function. (The choice of patient as decision-maker would scrap the prescribing function altogether, restricting the physician's role to advising the patient about drug choice – if asked.)

But this advantage, which amounts merely to saying that increasing the physician's information while not tampering with his decision involves no risk of conflict with the power structure of health care, is balanced by two serious disadvantages which render dubious the effectiveness of such an approach. First, it fails to combine information and incentive in the same decision-making locus. The physician has no incentive to respond to price signals when prices are paid by the patient. He has of course no direct incentive not to. But time and energy are money, and any time or effort the physician spends in exploring relative drug prices is a cost to him with no corresponding benefit. The role of inertia and transactions costs in economic decisions is inadequately explored, with the notable exception of the work of Leibenstein (1975, 1976); but the direct incentive to the physician to change current behaviour patterns, and to choose drugs on the basis of price as well as therapeutic effect, is lacking.[17]

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[17] There is a theory, more popular among economists than among health people, that the physician in acting on the patient's behalf responds to the patient's economic as well as health needs. In the complete agency version of this theory, a physician-patient unit exists combining the physician's information and the patient's preferences and using the former to optimize consumption choices with respect to the latter. Such a complete model is of course inconsistent with any plausible model of the economic behaviour of the physician *qua* supplier, and also with empirical data of all types about the health care system. But a partial agency relation undoubtedly exists. And while the professionalization of the physician is designed to reinforce this role only with respect to the patient's health, it may spill over into the economic sphere.

Counterpressures, however, are not. The whole marketing apparatus of the drug manufacturer is set up to influence the prescribing choice of the physician. Much of this effort is devoted to the creation in the physician's mind of artificial 'quality' distinctions which outweigh price considerations. As Steele (1962) put it: 'There is probably no other industry in existence where the disparagement of the quality of lower priced products can so completely substitute for actual price competition.' This pressure ties in with the physician's professional orientation on two levels. First, whatever sensitivity the physician may have to the patient's economic condition, he/she is professionally responsible for therapy, not finances. If there is any doubt about the relative safety or effectiveness of a lower-priced drug, price considerations must be disregarded. A bad drug is no bargain. And the creation of doubts is relatively easy for a high-powered marketing machine. Valid experimental demonstration of equivalence or difference on the other hand is very slow, difficult, and expensive. But commentators on the process whereby drugs are marketed to physicians describe an activity which has little or nothing to do with valid experimental demonstration. Moreover the identification of price with quality is made easier by its correspondence with a similar belief throughout the health care system. Health care providers, physicians included, regard price competition as 'unethical' in the market for their own services, and justify this collusive income maintenance strategy to themselves as well as to outsiders by the comforting belief that if one is inadequately paid, quality of care suffers. Hence price-cutting leads to or is associated with lower quality care. Hence it is unethical. At some income level, of course, the argument is true – what is always at issue is standards of adequacy. But the almost universality of this ideology among health care providers makes them more susceptible to the arguments that 'higher price equals higher quality,' 'you only get what you pay for,' 'cheap drugs are cheap,' etc., despite the absence of supporting evidence. The growing fear of malpractice suits among Canadian physicians who read US magazines will probably tend to increase this susceptibility.

Hence the necessary linkage between a PARCOST approach and the QUAD program of providing independent assurances of quality standards so that physicians can be certain that quality is *not* related to price. But the dice are inherently loaded in such a game; it is much easier to suggest a difference than to prove its absence. The economic structure of drug manufacturing, and the very large profits involved, create powerful economic incentives for the industry to combat the development of price sensitivity among physicians, the extensive and sophisticated marketing structure of the industry provides the means, and the professional ethos and training of physicians assist the task. In such an environment it seems an optimal strategy for the industry to trumpet the 'independence' of the physician, and to ally itself with the traditional professional values of medicine to ensure that the prescribing process remains wholly under the physician's control, i.e., placed where it can most readily be influenced by the manufacturer but not by anyone else.[18] This linkage between the professional 'independence' of the physician and the economic interests of the drug manufacturer, is stressed by Torrance and Liefmann-Keil, and appears to be central to the question of the price sensitivity of drug choice.

If the physician has minimal incentives to choose drugs in response to price information and is professionally vulnerable to drug industry marketing, and the patient is incapable of acquiring sufficient pharmaceutical information, there remains the pharmacist. One could rely on the pharmacist to substitute low- for high-priced drugs, given a particular prescription by the physician, in order to lower costs to the patient. The advantage of this approach is that, as a pharmaceutical specialist, the pharmacist probably has better information about drug characteristics than the physician and is certainly better informed about costs. In this respect he/she appears a logical choice as decision-maker about optimal drug use and as the locus of price-sensitivity in transferring competitive pressures to the drug manufacturer.

But, as Torrance has pointed out, such potential advantages disappear in the actual context of community pharmacy. Under professional dispensing fee reimbursement, the pharmacist has no incentive to choose the low-cost equivalent. Under the older percentage mark-up approach the incentive was to dispense the high-cost drug. Even now, insofar as pharmacists' earnings include not only dispensing fees but varying rebates or discrepancies between actual and list price of ingredients, it is clearly possible for a drug manufacturer to create an economic incentive to supply the higher cost item. Moreover the agency relation of the physician, weak as it may be, is lacking entirely for the pharmacist. The patient is not his or her patient, but the physician's.

The incentive to supply a low-price drug then reduces to the possibility that patients may become aware of particular differentials across pharmacies not in dispensing fees, but in prices of specific drugs, and may respond by returning to the lower-price pharmacy. Moreover, inventory costs may be reduced by carrying fewer brands. Ranged against this, the pharmacist who substitutes is threatening the drug manufacturing industry directly, and is interfering with the professional prerogatives of the physician. Even if legally within his/her rights, such a pharmacist is clearly at great risk of losing business through professional steering and a word-of-mouth blacklist which cannot be combatted because it cannot be demonstrated. Nor is this fear paranoic; such pressures constitute a rational and sensible strategy by drug manufacturers whose profits are threatened by the development of price-sensitive choice anywhere in the drug delivery system. To admit to such strategies would of course be politically unwise, but to fail to adopt them would constitute dereliction of duty to the shareholder. And to believe that profit-maximizing oligopolists would voluntarily refrain from a defensive strategy threatening low-price substituting pharmacies is, to say the least, naive.

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[18] Illustrative of this, when the Commission on Pharmaceutical Services (1971) recommended that pharmacists should have the right to substitute one brand of the same drug for another unless directed not to do so by the physician (147), a strong minority dissent was lodged by Commission member R. Larose, president of Ciba-Geigy Canada Ltd., on grounds of infringement of the manufacturer's trademark rights and the physician's professional responsibility.

At present, existing evidence on substitution behaviour is mixed. Tindall *et al.* (1974) report that in Alberta in 1972 only 2.68 per cent of prescriptions involved substitution by pharmacists for the specified drug. On the other hand the BC Pharmacists' Association reports (1973) from their product selection survey that willingness to substitute was very high and that the price of substituted prescriptions was on average 22 per cent below the originally specified amount (even larger than the 16.7-20 per cent savings suggested above). But the survey recognized the difficulty of establishing the prevalence of substituting behaviour, and reported only statements by responding pharmacies about whether or not they would substitute and how frequently. These statements of predisposition were not checked against actual behaviour, but they did suggest that surveyed pharmacists would tend to substitute about 38 per cent of non-generic prescriptions, and that an additional 30 per cent of prescriptions were written in generic terms. The relative prices of prescriptions in BC reported for 1972 by the C.PH.A. Survey (Fuller, 1973) are consistent with this survey: $3.91 compared with $4.73 in Alberta and a national average of $4.25, suggesting that BC pharmacists may indeed have been providing lower-priced drugs. Albertans, however, would appear not to. Whether such public spirited behaviour could survive a universal drug insurance plan is another question.

We are led then to the view that the inevitable incentive patterns bearing on both pharmacist and physician, under current modes of organization, make it unlikely that they can be relied upon to exercise price-sensitive drug choice on behalf of the patient, while the size of the information gap makes it impossible for the patient to choose on his own behalf. Hence the need to introduce a new decision-making agent into the drug delivery system, which can combine therapeutic and economic information with price sensitivity. Thus the entry of the public drug insurance agency into the drug wholesaling process becomes a logical development of countervailing power balancing the market power of the drug manufacturer. As the Manitoba Advisory Committee (1972) pointed out, this does not require a province to go into the wholesaling business on its own account any more than the acquisition of drugs at competitive prices requires one to make one's own. What *is* necessary is that the provincial insurance plan centralize drug purchasing at the wholesale level on a competitive tendering basis, the actual physical wholesaling function can then be contracted out to existing companies. The objective of such a strategy is to induce a greater degree of competition and efficiency in drug delivery, not to suppress it through unnecessary 'provincialization.'

The strategy of provincial purchasing, as appears well understood in Manitoba and Saskatchewan where the concept takes concrete form, inevitably requires modification of the prescribing process. As noted above, this is true of all strategies for change other than that which simply passes more information to the physician in the hope that he will read it. A public purchasing agency must *choose* among different suppliers of the same drug in response to price signals; it follows that its purchases cannot be predetermined by the pattern of brands which physicians have prescribed. A purchasing agency, public or private, whose function is restricted to acquiring various quantities of specific brands as selected by physicians has no degrees of freedom of choice and consequently cannot vary its choices in response to price signals. It follows that it cannot by its purchases impose constraints on the pricing policies of drug manufacturers – hence the great economic interest of the drug manufacturer in the 'professional independence' of the physician. Centralized purchasing thus requires an associated formulary of approved drugs and defined equivalences, just as it does in a hospital. The prescription may arrive at the pharmacy in generic or brand form, but the pharmacist will fill it with the generic equivalent made available by the wholesaler and the supplier of that equivalent will vary depending on the outcome of the competitive contracting process.[19]

Critical to this process is of course the definition of the formulary of approved drugs and of equivalences, which is obviously an activity requiring close co-operation between the public agency, physicians, and pharmacists. This is the key point where expert knowledge, as opposed to competitive forces, must be brought to bear. Such a formulary is potentially a very important educational tool, as it provides a way in which expert medical opinion can identify ineffective or dangerous drugs (such as the much-criticized combination products) and can bring this information readily to the attention of physicians in the field by a recommendation that the public insurance plan not reimburse the patient for the use of such drugs. It is then possible to reinforce in a very direct manner efforts to improve the prescribing process by attempts to provide better pharmacological information to practising physicians either during their initial training or on a continuing education basis. Such improvement of prescribing appropriateness is inherently an expert, professional problem, not amenable to competitive market forces; refusal to reimburse an inappropriate prescription is not intended to discourage the patient's consumption of the drug by market pressures but rather to signal to a physician that his colleagues feel he has made a mistake. In the long run, the potential educational role of a drug insurance program in bringing together expert medical opinion to improve patterns of prescribing is probably its most important economic effect as well as its greatest benefit to the health of the public. To squander such a potential benefit by confining one's attention to 'paying the bills' and periodically harassing an over-charging pharmacist while letting the present prescribing process carry on (with the self-interested assistance of the drug manufacturing industry) with 'business as usual' would be worse than a crime – it would be a mistake.

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[19] Obviously such a procedure requires quality monitoring and control of the manufacturing process; but such quality monitoring has been worked out long ago by public and private agencies which buy on a tender basis.

SUMMARY

The drug delivery system can be broken into three components, each of which presents different types of problems and which suggests different solutions. The problem at issue in the dispensing function is over-use of highly-trained professional manpower to perform dispensing functions many of which are now more properly those of pharmaceutical aides, as well as to spend a high proportion of their costly time in non-pharmaceutical roles. At this level of the industry, it is estimated that 11.4-16.7 per cent of present prescription prices could be saved by a more rational use of pharmacist manpower. The appropriate mechanism for achieving savings appears to be the promotion of competitive forces through disaggregating the prescription charge into ingredient cost and dispensing fee, insuring the former, and letting the patient pay the latter. In principle this amounts to assuming that the patient has enough information to make rational choices in response to price signals about where he/she will purchase dispensing services, but not about whether to purchase a particular prescribed drug or which one to purchase.

A further potential saving could be achieved by introducing more competition into the market for drug ingredients. Excess profits by large drug companies plus extremely high marketing costs are estimated to make up another 16.7-20 per cent of prescription costs, which could be reduced by drug acquisition through a competitive tendering process. This process would have to be carried out by a public purchasing agency, since the generation of countervailing power to limit the present market power of large drug manufacturers cannot be based on any of the existing participants in the drug delivery process. Patients cannot reasonably be expected to acquire sufficient information, while physicians and pharmacists have no direct economic incentive to act in a price-sensitive manner and are open to too much marketing pressure from drug suppliers to do so.

Finally, in addition to these estimated total potential savings of 27.1-36.7 per cent[20] (which may themselves be conservative; a great advantage of competitive processes is their ability to generate better information), further gains in both health and economic terms could come through improving prescribing appropriateness. A centralized drug insurance plan could provide a mechanism whereby the medical and pharmaceutical professions could get a better picture of what is currently going on and could bring their expert judgment to bear. No estimates of potential gains from this process have been made, but they could be significant not only in reducing drug costs directly but in reducing unnecessary hospitalization and medical care as well. One cannot put a numerical estimate on these gains, but they could be very large. Nevertheless the identified cost savings on both ingredient and dispensing costs from a more efficient drug delivery system amount to $80-110 million per year for a hypothetical Ontario universal drug insurance program otherwise costing $300 million. Not all such savings would be immediate; they require some long-run adjustments in delivery. But the actual numbers are relatively conservative.

The evolution of the drug delivery system as thus sketched out would eliminate most of the justification for direct insurance or prepayment. If ingredient costs are reimbursed by the provincial government directly to the pharmacist, this would reduce prescription costs to the consumer by 50 per cent. A further reduction of 11.4-16.7 per cent of the present prescription price resulting from improved dispensing efficiency implies that patients' out-of-pocket costs for drugs would fall to 33.3-38.6 per cent of their previous levels. Even at this reduced level there might still be a very small part of the population facing unacceptably high costs for prescription drugs; one might cover this group by an insurance program with a deductible set at $75 or $100 of out-of-pocket costs. The number of people involved would obviously be very small.

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20 For comparison, McCaffree and Newman (1968) report estimated total savings of 28 per cent for GHC of Puget Sound.

4

Denticare and its alternatives: insurance options

INTRODUCTION

The provision of dental services, as with pharmaceutical services, would appear at first sight to be a logical extension to the existing Canadian system of public hospital and medical insurance programs. Just as no obvious justification presents itself for limiting public intervention to the payment only for therapeutic procedures performed or initiated by a physician but not for the drugs prescribed, so too it seems peculiar that individuals should bear the financial consequences of diseases of the teeth and supporting structures but not of the results such disease processes may have on their total health. As is the case with pharmaceutical services, however, this process of apparent logical extension appears to be at present stalled. Certain provinces have initiated or have under discussion public dental care programs for such sub-groups of the population as children, welfare recipients, or the aged; however, federal encouragement and more importantly cost sharing have not been forthcoming and consequently the tempo of the public advance has clearly slowed. The general climate of fiscal stringency and recession is obviously a major factor in this pause, but as noted previously in the case of pharmacy, there are also significant questions which arise concerning both the social purposes to be served by the extension of public dental care programs and also the financial implications of over-hasty adoption of the current private market-place structure of providing dental care as the basis for a public program. The *New Perspective on the Health of Canadians* (Lalonde, 1974) which has emerged from the federal government in reaction to the medicare experience reflects a concern that public insurance programs may freeze in place a relatively expensive and inefficient delivery system which is not optimally structured to deal with the major present and emerging health problems – its big guns may be pointing the wrong way. Extension of the medicare model to dental services, namely denticare, or paying the bills generated by an independent private sector, may simply extend this problem.

The analysis of such a public denticare program, and the specification and comparison of alternative options for public intervention in the delivery of dental services, is in some ways simpler and yet in other ways more complex than the corresponding task undertaken previously for pharmaceutical services. On the one hand, the organizational structure of dentistry is simpler in that it is built around a single organizational and decision-making unit, the dental practice. The complex inter-related but independent pharmaceutical pattern of prescriber, dispenser, and manufacturer is absent. The dentist both prescribes and dispenses treatment. While a manufacturing component does exist for dental equipment and supplies, raising some interesting economic issues in its own right, it may safely be excluded from this discussion both because it represents a relatively small part of total dental care costs and because it does not appear to influence the patterns of treatment to the same degree that drug manufacturers influence physician prescribing.

On the other hand, within the dental practice the problem of conceptualizing 'output' is considerably more difficult simply because the practice carries out a much wider range of activities than does a pharmacy (excluding non-pharmaceutical retail activity). The range of different services received by patients is much greater, hence it is correspondingly more difficult to address questions concerning the relative efficiency with which services are produced (and the associated issue of auxiliary use), or the relation between service utilization, patient demands, and needs for services. The actual or potential role of the price mechanism also becomes more difficult to evaluate as the exact definition of what is priced becomes more obscure and as services become more diverse and less homogeneous.

Fortunately for the purposes of this study, there exists substantially more literature on the specification of activities within individual dental practices, and also on the definitions of entire public programs. We are able to draw on analyses of potential children's dental care programs in Saskatchewan (1973), BC (1974), and Quebec (1975, 1976) and also outcome data from those plans initiated in Saskatchewan and Quebec, as well as a federal study prepared by Lewis and Brown (1973). The series of federal 'affluent communities' studies for the various Canadian provinces provides baseline data on utilization rates and patterns in private practice, while an extensive and growing literature (particularly in the US) is addressing with increasing sophistication the problems of task definitions and otpimal personnel mix within the individual dental practice or clinic.

A COMPREHENSIVE PROGRAM: COST ESTIMATES

Paralleling the methodology of chapter two, we begin by specifying a universal denticare program for Ontario in 1975, which extends the existing provincial health insurance program to provide coverage for all residents on a 100 per cent first-dollar basis for all dental services with no point-of-service charges. The costs of such a program are then estimated on the basis of various assumptions concerning levels of utilization of services and fees, and their response or lack of response to the introduction of a public program. Such a universal program will then be evaluated according to the criteria of chapter one, namely, risk reduction, wealth transfer, improvement of utilization patterns, and delivery system efficiency. Alternative partial insurance-type programs will also be specified and costed. Finally we shall attempt to specify, cost and evaluate certain alternatives to the insurance-based denticare model.

In the course of the discussion, the concept of utilization plays an important role in cost estimation. Unfortunately utilization in this discussion, as in the literature generally, has two related but distinct meanings. It may refer to the total volume of dental services received by a particular individual or population in a given time period, or it may, as in appendix D, refer to the proportion of that population which receives some dental services in the time period. Utilization in the first sense, of total services supplied, is the relevant concept if one is attempting to project total costs of an insurance program. Total expenditures will be the product of total services supplied and fees per service. It is this concept of utilization which gives rise to the relatively large elasticities of demand quoted below; a reduction in prices paid by users of dental services may well lead to a significant increase in services supplied. But this observation is not inconsistent with relatively small increases in utilization in the second sense, the proportion of the population receiving care; and it is utilization in the latter sense which, as explained in appendix D, is the proper social objective in utilization promotion. Of course dramatic increases in utilization in either sense on a population-wide basis are ruled out in the short run by supply constraints. In the early part of this chapter, which focuses on projecting the total costs of alternative dental insurance programs, utilization will usually have the first meaning of total service volume, but as emphasis shifts to evaluation the second concept of proportion of population participating will be more common. Which is meant should be clear from the context.

Data compiled by the federal Department of National Health and Welfare and reported in 'National health expenditures in Canada, 1960-73' (April, 1975) estimated total *per capita* spending on dental care in Ontario as $21.01 in 1973. The total cost of a 1975 denticare program, assuming no response in utilization and fee levels to the program itself, can be calculated by adjusting this *per capita* figure upwards for changes in both utilization and dental fees from 1973 to 1975, and then multiplying up by the population and adding an estimated administrative cost.

Desjardins and Lewis (1975) report that Ontario Dental Association fees rose an average of 6.0 per cent from 1973 to 1974 and 21.0 per cent from 1974 to 1975. At the same time it appears that the use of the ODA fee schedule has been spreading, and in general this represents an increase from dentists' individual 'usual and customary' fees which tend to run below the schedule. Hence 1.060 × 1.210 = 1.283 or 28.3 per cent represents a conservative estimate of fee changes from 1973 to 1975. This would raise *per capita* costs from $21.01 to $26.96 assuming that no utilization response had occurred.

Utilization responses might occur for several reasons. Demand for dental services appears to be relatively sensitive both to increases in real incomes of consumer/patients, and to prices of dental services. Maurizi (1975) reports his own and several others' estimates of the income and price elasticity of dental service demand (based on US data), which suggest income elasticities of approximately +1.0 to +1.5 (possibly as high as +2.0), and price elasticities in the neighbourhood of –1.5. From 1973 to 1975 the general price level as measured by the Consumer Price Index rose by 22.9 per cent (Canada, Statistics Canada, June 1976), so the real price of dental services relative to this base rose by 1.283/1.229 = 4.4 per cent. Using a price elasticity of –1.5 one would predict a resulting fall of 6.6 per cent in utilization. However, personal disposable income *per capita* rose 35.2 per cent or adjusting for price change, 1.352/1.229 = 10.0 per cent. This would lead to an estimated increase in utilization of 10-15 per cent resulting from the income response. Hence the net effect of price and income changes should be a utilization *per capita* increase of 3.1-8.2 per cent from 1973 to 1975.[1]

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[1] It will be noticed that this estimate makes no allowance for the spread of private dental insurance programs between 1973 and 1975 which could increase utilization rates even further. The resulting under-estimate of 1975 utilization will, however, tend to be cancelled out when the estimated utilization increase resulting from public insurance is applied to the whole population. Insofar as private insurance would increase utilization in the absence of a public program, it would correspondingly reduce the additional increase in utilization which would result from a public program. This cancellation effect does not, of course, apply to the utilization increase estimates derived from the supply side – the increase in dentist-population ratios and dentist productivity – as these may in fact correspond to insurance effects.

One can also attempt to estimate utilization changes from the supply side. The total stock of dentists in Ontario has risen about 8 per cent from 1973 to 1975 while population is up 3.5 per cent, so dentists *per capita* have risen 4.3 per cent. Productivity per dentist probably rises between 1 per cent and 2 per cent per year, and so an estimate toward the high end of the 3.1-8.2 per cent range seems appropriate. Accordingly we assume a 7 per cent increase in utilization from 1973 to 1975. Adding this to the 28.3 per cent increase in fees we derive estimated *per capita* costs of dental services in Ontario in 1975 as \$21.01 × 1.283 × 1.07 = \$28.84. Since the reported population of Ontario in mid-1975 was 8.237 million, the estimated cost of dental services is \$28.84 × 8.237 = \$237.6 million. Assuming further on the basis of medicare experience that administrative costs would be about 5 per cent, we reach a total program cost of \$249.5 million. This estimate, of course, is based on the (dubious) presumption that neither utilization nor fee levels would respond to the introduction of the program itself. As far as fee levels are concerned, these would in any public program depend on the outcome of the negotiation processes between the profession and the provincial government and no useful purpose would be served in trying to predict that outcome. An X per cent increase in fee schedule items translates of course directly into an X per cent increase in program costs. There would be some increase in program costs due to the fact that the public program would presumably reimburse dentists on the basis of the ODA schedule. This would represent an increase for certain dentists currently charging below the schedule, but it is not known either how many such dentists remain or how far below the schedule, on average, they are. Desjardins and Lewis (1975) report that in 1968 (the last year for which data were available) 50.9 per cent of Ontario dentists reported that they followed the ODA schedule. This proportion has presumably risen, as it is said that new entrants to practice tend to use the schedule and older dentists whose fee-setting policies pre-date the schedules are more likely to be independent. Supposing three-quarters of dentists now use the schedules, and non-users who billed below the schedule did so on average by 10 per cent, the implied adjustment to plan

The net change from both price and income response cannot be estimated by adding or multiplying the individual effects. Assuming a relation between quantity, price, and income which is linear in logs (thus yielding constant elasticities), the computation is:

$$\ln(Q_{75}/Q_{73}) = E_p \ln(P_{75}/P_{73}) + E_y \ln(Y_{75}/Y_{73}),$$

where $P_{75}/P_{73} = 1.044$, $Y_{75}/Y_{73} = 1.10$, and E_p and E_y are the estimated price and income elasticities of demand.

costs would be only 2.5 per cent. Hence effects from this source are likely to be small. (Except for the dentists involved.)

Much more important, and difficult to predict, are changes in utilization patterns resulting from the introduction of a public dental care program. Such changes may be either demand-side or supply-side induced. Insured individuals generally are more likely to seek care, and more willing to accept whatever forms of treatment are recommended. Dentists treating an insured clientele will tend to recommend a wider range of probably more expensive services knowing that patients do not bear the costs directly. Hence one must avoid the facile argument that utilization changes associated with public insurance plans reflect *only* patient decision-making in response to changed point-of-service prices or as an economist would say, movement along a demand curve. Such a mis-specification of the decision-making process underlying health care utilization can and does lead to erroneous policy prescriptions for utilization control. Regardless of the generating mechanisms however, it is the utilization response to universal dental insurance which has the greatest potential for cost escalations beyond estimates of the type developed above.[2]

There are several different ways of approaching the problem of estimating the utilization response to a universal insurance plan. The traditional economic approach is to derive estimates of the price elasticity of demand from inter-regional or cross-time observations of different utilization rates associated with different price levels. The user population in the different observations must be assumed either similar, or different in ways which are measurable and which have utilization effects that can be controlled for separately. The resulting estimates of percentage change in utilization in response to percentage change in price can then be extrapolated to estimate the effects of insurance as a price-reducing mechanism – in the case of first-dollar 100 per cent coverage, a

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[2] In principle it is conceivable that dental insurance could reduce utilization in the sense of volume of services *per capita* if more regular dental visits had a preventive effect which lowered the incidence of dental disease. Unfortunately there is no evidence that frequency of dental visits has a significant impact on the incidence (as opposed to the prevalence) of dental decay. It may help in the control of periodontal disease, and may limit such disease conditions as they develop, but it appears that the cheapest form of dental care is still full mouth extractions followed by dentures. An illusion of preventive effect is easily created at the individual practice level, since patients who return more frequently have less disease on each visit; and at the program level, since the backlog effect of previously untreated prevalence can lead to high initial period cost per patient followed by subsequent reductions. However such observations are related to changes in prevalence, not in incidence. At the clinical level, more dental health is more expensive than less. Of course community water fluoridation is another matter.

100 per cent price reduction. The weakness of this approach, of course, is that apart from the many statistical problems of estimating price responses, the extrapolation of estimated responses to marginal price differences all the way over to zero point-of-service charges involves a definite leap of faith.

An alternative traditional dental approach involves the drawing up of a list of services, the 'optimal' frequency of services, for a given population receiving maintenance or regular on-going care. Then, assuming that a given population under full insurance will in fact receive optimal care, the optimum procedural frequencies can be combined with the prevailing fee schedules to determine *per capita* costs. The weaknesses of this approach are first, that even under full insurance many people do not seek care as often as experts believe they should – the barriers to dental care are by no means all economic – and secondly, there are almost as many definitions of optimal care as there are dentists. The negotiating process by which optima are established appears to be biased towards the highest common frequency – more is always better. As a result the optimum frequency approach leads to very large estimated expenditures.

Two intermediate methods involve using actual procedural utilization data for specific sub-populations in order to estimate utilization patterns in the absence of economic constraint. The federal 'affluent communities' studies (Canada, Department of National Health and Welfare, 1971, 1974a, b, c) involve selection of dentists' records to observe utilization procedural frequencies by certain patients who were under continuous and regular care by a dentist in regions where incomes are believed high enough that such use may be considered optimal care, at least as defined by the practitioners. Alternatively, one could examine insurance records to observe utilization patterns by actual insured populations. The 'affluent communities' approach, by selecting records for continuity and completeness, has the advantage of approximating a professionally defined standard of 'good' care as reflected in actual use; it is thus a more realistic upper bound than the optimal frequency approach. On the other hand, the insurance data approach reflects actual use patterns under zero point-of-service charges with no other change in the delivery system.[3] It is thus the conceptually superior source of data; but like the elasticity of demand estimates it has no normative significance. Moreover such sources tend in practice to be contaminated by co-payment provisions or other specific features in individual contracts whose effects on utilization are difficult to determine. Finally the records of private insurers are kept for purposes of rate-setting and policy administration, not epidemiological research. Conversion of such data to well-defined population denominators is usually possible, but time consuming and expensive. It would be an important and obvious step for a government planning agency to contract for such data, but it was judged beyond the scope and capacity of this study.[4]

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[3] All utilization-response estimates predict relatively large increases in dental workload and costs in response to a public insurance program. Since in fact dentists are not generally underemployed and in the short run the supply cannot rapidly be adjusted, it is clear that these increases must be regarded as long-run tendencies. The short-run effects will be excess demand for services and (since fee schedules are negotiated independently of the state of demand) various forms of non-price rationing. This problem did not arise in the case of pharmaceutical services as the utilization response was estimated to be lower and the industry appears to display significant excess dispensing capacity.

As noted above, estimates of the price elasticities of demand for dental care from several different US studies reported by Maurizi (1975) are in the neighbourhood of –1.5. This would imply an increase in utilization of 150 per cent in response to a 100 per cent drop in point-of-service prices. Newhouse (1976) suggests a somewhat lower estimate, an elasticity range of –0.8 to –1.4, leading him to a range of 80-140 per cent increases in utilization. On the base *per capita* figure for 1975 estimated above of $28.84, an increase of 80-140 per cent yields estimates of $51.91-69.22 while a 150 per cent increase implies *per capita* costs of $72.10. The associated program costs, for a population of 8.237 million and assuming 5 per cent administrative costs are $449.0-598.7 million, and $623.6 million.

Disturbingly large as these estimates are, they compare fairly well with the data generated by the federal 'affluent communities' study in Ontario (Canada, Department of National Health and Welfare, 1971). That study estimated on the basis of dentists' records for continuing care patients that at 1965 prices average annual costs per person-year of exposure (i.e., per year in which the patient whose record was studied was under continuing care whether or not services were received in that year) were $44.52. Desjardins and Lewis (1975) report that from 1965 to 1975 the ODA fee schedule index has risen 86.9 per cent, implying a 1975 cost per year for 'optimal' care as defined by professional practice, of $44.52 × 1.869 = $83.21. In order to convert this to an Ontario average *per capita* figure, we have made adjustments for three factors. First, the dentists' records studied do not include any children under three years of age as such children rarely incur dental expenses. The total Ontario population, however, includes this group of course, so the average *per capita* cost must be adjusted downwards. Secondly, the age distribution of the Ontario population has changed since the study was carried out and estimated expenditures vary considerably by age. Finally, the study was performed in two communities with non-fluoridated water supplies; the Ontario average costs would in fact then be lower because of the reduced incidence of dental decay in fluoridated communities.

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[4] The British Columbia Children's Dental Health Project (British Columbia, 1974) compared data from the federal 'affluent studies' (Canada, Department of National Health and Welfare, 1974) project in British Columbia with the records of a private non-profit dental insurance plan for children with no copayment features, and found that the pattern of services provided *per user*, in a 12-month period, was quite similar. Only about 70 per cent of the eligible insured children, however, actually received services (British Columbia, 1974, chap. 11).

Adjusting the age-specific cost data from the 'affluent communities' study (five-year groups) by the estimated 1975 age-specific population of Ontario changes the \$44.52 figure to \$43.76. Estimating 4.9 per cent of the population in 1975 to be in the age-group 0-2 further reduces this figure to \$43.76/1.049 = \$41.72. Finally, the effect of community water fluoridation is assumed to lower dental treatment costs by eliminating 50 per cent of restorations placed in the age groups under age 18. This adjustment reduced total treatment costs (on the 1975 population mix) by 8.05 per cent; but only 60.8 per cent of the Ontario population was consuming fluoridated water as of December 1972 (Canadian Dental Association data), and more recent changes in this percentage would not of course have significant effects by 1975. Thus we adjusted downwards the estimated *per capita* cost of optimal care in 1965 dollars by 0.0805 × 60.8 = 4.89 per cent, to \$39.68. Adjusting this to 1975 dental fees yields \$39.68 × 1.869 = \$74.16, on an Ontario-wide average basis. If this 'optimal' care were provided to the whole population of 8.237 million in 1975, and assuming a 5 per cent cost of administrative overhead, total program costs would be 8.237 × 1.05 × \$74.16 = \$641.4 million.

These estimates bracket an appallingly wide range. It appears that a public dental insurance program which had no impact on utilization (and therefore presumably yielded no over-all improvement in dental health) could have been introduced in Ontario in 1975 at a cost of \$249.5 million. However a program which actually succeeded in providing professionally determined levels of 'needed' care, according to present modes of production and prices, would have cost \$641.4 million. Between these end points, various demand elasticity estimates in the literature suggest anything from \$449.0 million to \$623.6 million – singularly unhelpful.

An alternative way to approach the problem, however, is to consider utilization levels in the population at large defined by the proportion of the eligible population which actually contacts a dentist in any one year. Assuming that, in the absence of price constraints, a patient who contacts a dentist will subsequently receive professionally 'optimal' care, one can then adjust the upper bound cost of optimal care by a predicted utilization rate to yield a cost estimate.

One further small adjustment must be carried out because if we define utilization in this manner, the 'affluent studies optimal' pattern of utilization in Ontario is in fact not 100 per cent but 98 per cent. The person-years in which a visit to a dentist occurred are slightly below the total person-years of exposure in that occasionally a patient under continuing care may not make a visit during a particular calendar year although receiving care in both previous and subsequent years. Thus, for example, an insured population with a 70 per cent utilization rate would be estimated to generate costs of 0.7/0.98 multiplied by the optimal program costs, and not 0.7 times the optimal program costs.

One can also reverse this process, the various price elasticity of demand estimates themselves imply utilization rates. A price elasticity of −1.5 implying program costs of $623.6 million also implies a utilization rate of 95.3 per cent, [(623.6/641.4) × 0.98], which is far higher than any rate ever observed to our knowledge in an actual, functioning dental insurance plan. This suggests that, whatever their merits in predicting responses to small price changes, the very large elasticity estimates probably overstate the utilization response to a complete removal of price barriers by a very wide margin.

Discussions and estimates of dental care utilization levels in Canada and in Ontario are provided in Lewis and Brown (1973), while Ellis (1970) outlines some of the problems and results of attempting to derive utilization rates from dental insurance data. He points out (p. 88) that: 'The overall percentage utilization rates of the dental care plans varied from 25 per cent to 84 per cent ... However, these overall rates are relatively meaningless...,' and subsequently, 'The only generalization from these figures that seems safe ... is that removal of the financial barriers to dental care did not of itself create a stampede for such care.'

Except for one very exceptional insured group with high income and education and open enrolment, which achieved a utilization rate of 84.4 per cent, the highest utilization rate found by Ellis was 70 per cent. The BC report (1974) studying children's dental care found that for a group of BC children with 100 per cent first-dollar coverage, utilization reached 70 per cent. In general, adult utilization rates tend to run well below child rates. A WHO study of medical care utilization (1973) in selected Canadian sites reports on utilization rates for dental services, based on visits to the dentist in the past twelve months for all ages. The rates were 41.2 per cent for Grand Prairie, 48.9 per cent for Saskatoon, and 45.1 per cent and 38.8 per cent for two areas in BC's Fraser Valley. Moreover the BC report found that utilization data based on surveys of dentists tend to be upward-biased. Visit records are comparatively good, but patient records involve those who may have changed dentists or been patients of more than one dentist in a given year, or even simply have not been seen for over a year. This problem emerged from reported regional 'utilization rates' of over 100 per cent.

Thus 70 per cent would appear to be an upper bound for utilization rates under insurance. A DBS survey of dental utilization in 1967, reported in Lewis and Brown (1973) and in more detail in the Ontario affluent communities study (Canada, Department of National Health and Welfare, 1971) showed utilization rates of 48 per cent in Ontario. This figure must surely have risen since then. On the other hand 'utilization' probably means different things for insured and uninsured populations. This is suggested by the observation that estimated 'no utilization response' costs of \$249.5 million are only 38.9 per cent of 'optimal' costs of \$641.4 million, implying a 38.1 per cent utilization rate which is surely too low.[5] This can be explained if uninsured populations generate lower costs per user per year as well as fewer users. On the basis of these diverse sources, a total-population utilization rate of 60-70 per cent under insurance in 1975 is probably a fair range, implying total program costs for 'optimal care' of \$392.7 to \$458.1 million (Table 3).[6]

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[5] This ratio of estimated current actual to estimated 'optimal' is disturbingly low. If one assumed that all those who seek care receive 'optimal' care, it implies that fewer than 40 per cent of the population see a dentist in any one year. This is lower than most reported estimates – see, e.g., Lewis and Brown (1973). We have implicitly assumed that the average patient in fact receives fewer services than either the insured or the 'affluent' patient, or that mode of treatment varies significantly with the resources of the patient or the method of payment. As Ellis (1970, 105) reported for dental insurance plans: 'Also it would seem that while there was not a significant increase in overall average utilization from that of the general population, there appeared to be an increase in the average amount of care received.'

There are, however, other possible explanations for the discrepancy. The estimates of present expenditure levels are based on income tax data reported by dentists. In both Quebec and Saskatchewan, introduction of medicare was associated with very large ($\simeq$ 50 per cent) ***reported*** increases in medical care costs ***per capita*** which were asserted by some observers to be partly due to improved income reporting. Under-reporting of incomes by Ontario dentists would lead to an under-estimate of low-end program costs (the \$249.5 million estimate). Moreover, as noted we have assumed that all prices are at ODA fee schedule levels; insofar as current prices may be on average a bit below these levels, the \$249.5 estimate is again low. We do not know how to quantify these effects.

[6] It may be worth reiterating that this is a potential or long-run estimate. A province-wide program would obviously not be able to generate an increase of 57-84 per cent in one year – the resources are not there. However what is shown is that relatively conservative

TABLE 3

Estimated total costs of a private practice-based denticare program: various coverages (Ontario 1975)

Type of coverage	Costs ($ million)	% of population benefitting
Total population, full insurance (assuming no change in present levels of care or utilization rates)	249.5	38.1
Total population, full insurance (optimal level of dental care services)	641.4	98
Total population, full insurance (optimal care for users, expected utilization in response to insurance)	392.7-458.1	60-70

NOTE: All costs include a 5 per cent administration cost

The state of available information on Canadian utilization rates is reflected in a recent paper by New and New (1975) surveying Canadian studies of dental utilization and generating not a single number in conclusion!

EFFECTS OF PUBLIC INTERVENTION

Given this baseline estimate of dental program scale and costs, we must then ask how such a major public program could be related to the criteria for public intervention. As developed in previous chapters we argue that a public payment program can have an impact on both recipients and providers of care. As an insurance mechanism, the program can reduce and spread risk across the covered population. Insofar as premium or tax costs of participation are dissociated from an individual's *a priori* expectation of use, the program also serves to redistribute wealth from low to high users of services. In addition if it leads to price increases

assumptions about utilization response can still lead to very large increases in dental care utilization and costs which will in the short-run be reflected in excess demand pressure and non-price rationing, but over a longer time-horizon will be translated from potential to actual utilization and costs.

for dental services the program has the effect of redistributing wealth from patient/taxpayers to service providers. In tending to encourage dental service utilization the program will hopefully have some positive impact on the level of dental health in the community. Finally by changing the source of payment of providers from individual users to a public agency the program may affect the mode of organization and efficiency of the dental service delivery system. Each of these effects represents a separate type of public objective which may be more or less well-served by a given type of program. As in chapter two we begin by evaluating as a baseline a universal first-dollar public dental insurance plan against these criteria, then move to consider partial coverage plans of various types, and finally consider public intervention of a more direct, non-insurance type, involving simultaneous action on supply and demand sides of the dental service delivery process.

RISK SPREADING

The traditional argument for insurance has always been as a method of spreading risk. As analysed in more detail in chapter one, it is a social mechanism whereby transactors with approximately equal prior expectations of uncertain future losses can pool risks and benefit from the substitution of a small certain loss (premium) for a much larger but uncertain one. The benefits from such insurance are the greater, the larger is the loss which is insured against, and up to a point, the more unlikely. A relatively small, relatively predictable loss is generally not worth insuring in the sense that the various transaction costs of insurance outweigh the comparatively small reductions in risk achieved thereby. Hence the traditional view that dental care is not insurable, since it represents a common, regular, predictable, and controllable expense. Ellis (1970) in his study of voluntary dental prepayment and insurance plans, outlines the principles of insurability and notes that dental insurance violates them all. He refers to the expansion of dental prepayment plans as taking place ‘despite these anomalies’ (4). Frankel and Boffa (1974, 53) are more blunt: ‘the expenditures for dental care is [*sic*] not an insurable risk.’ Hence they argue: ‘Prepaid dental care plans are essentially a budgeting type of arrangement in which predictable expenditures are planned for.’ It does not follow from this line of argument that there is no justification for a public dental care program of insurance or other form – such a program may be desirable in terms of other public objectives. However this conventional view does suggest that public intervention cannot be supported on the grounds of response to failures in private markets for risk-bearing – there is little or no risk to bear. If dental prepayment plans are rather a matter of convenience in budgeting, as Frankel and Boffa suggest, the justification for public intervention must lie elsewhere.

It is of course possible to support a contrary view by observing actual distributions of dental expenditures which vary considerably from one individual to another. Thus Morehead *et al.* (1971) report data for the Teamster Comprehensive Care Program in New York in which during a 30-month period 26 per cent of eligible members had no visits while 12 per cent had eighteen visits or more. This 12 per cent accounted for 37 per cent of all visits, while 36 per cent of the enrolled population with ten or more visits accounted for 76 per cent of all visits. Such data suggest great unevenness in the distribution of dental expenses among individuals, which as demonstrated in chapter one is a necessary though not a sufficient condition for insurability. Similar, though less clear-cut, dispersions are suggested in the 1967 DBS survey of Canadian dental service utilization – out of 14,115 persons sampled in Canada aged 14 or over, 8395 or 59.5 per cent had no visits (or presumably expenses) in 1967, while 1071 or 7.6 per cent had four or more visits (Canada, Department of National Health and Welfare, 1971, addendum).

This type of observation, however, can easily arise out of confusion between incidence and prevalence. In the dental case, the deferability of care for a given condition makes it possible for large variations in expenditures across individuals in a given year to arise simply due to the individuals' choice of timing of restorative care. The Morehead *et al.* (1971) observations cited above were probably the result of a situation described later in the same article – the program of subsidized care was known to be terminating at the end of the 30-month period, and patients who had accumulated extensive and expensive needs for fixed bridgework or dentures were hurrying to complete these services. Hence the large variations in visit rates reflected varying degrees of accumulated service needs, rather than variations in the incidence of new problems during the study period. The same problem undoubtedly affects the DBS survey data. It is reported that employed labour force members were almost twice as likely to seek dental care (1039.0 visits per thousand population) than were the unemployed (593.4 visits per thousand). Visits per user per year were quite similar, 2.4 versus 2.2. However unemployment is not a permanent state, and such an observation in no way indicates a difference in dental utilization patterns across two well-defined populations. People are less likely voluntarily to incur postponable expenses like dental care when their incomes are temporarily lowered by unemployment. When such postponement or backlog effects are taken out of account, however, the general pattern of dental care expenditures is of a regular and recurrent flow of maintenance expenditures, none of the order of magnitude of even a modest episode of hospitalization. Such a pattern does not constitute an insurable risk.

WEALTH TRANSFER

If the justification of public dental insurance is not risk spreading, we may turn to consider its wealth transfer effects. In the case of pharmaceutical services, it could be argued that such spending is more heavily concentrated among the elderly and/or the ill, and that a public program which transferred the burden of these expenditures to those who were younger and/or healthier by means of actuarially unfair premiums and/or general tax revenue financing would have wealth transfer effects generally in accord with current social objectives. However the wealth transfer effects of public dental insurance seem if anything to go the other way. As noted earlier, the income elasticity of demand for dental services is variously estimated but such estimates tend to fall in the range of +1.0 to +2.0. This indicates that as incomes rise across individuals, dental expenditures rise at least as fast (+ 1.0) and probably faster. Higher-income people spend more on dental care than lower-income people, not only in absolute terms, but as a proportion of their incomes. This finding tends to be confirmed by studies which relate dental spending to socio-economic class, Ellis (1970, 93) reports New York data showing a steady rise in annual utilization rates from 45 per cent for unskilled workers to 70 per cent for professionals (with one aberrant observation of 77 per cent for sales workers) in insured populations. Andersen and Anderson (1967) report percentage utilization rising by income class from 16 per cent for the $0-1999, 25 per cent for $2000-$4999, 40 per cent for $5000-$9999, and 58 per cent for $10,000 and over (47). Moreover as Nikias (1968), Ellis (1970) and Lewis and Brown (1973) have pointed out, the differences in utilization patterns by socio-economic class do not appear to be solely or even primarily due to the interaction between ability to pay and point-of-service charges – they do not disappear in insurance plans.

It follows that a public dental insurance plan which did not significantly influence utilization rates would in fact serve to subsidize the relatively higher-income classes who now use the largest proportion of dental care. The total distributional effect of such a plan would of course also depend on the progressivity of the associated marginal tax change – clearly a program financed by a sufficiently progressive marginal adjustment in income taxes could represent a net transfer from higher to lower incomes. However, any program financed out of taxes with lower income elasticity than dental care spending itself, which would certainly be true of compulsory premiums, will tend to have wealth transfer effects which are counter to the redistributional objectives generally assigned to the public sector. Such perverse redistributional effects are particularly likely to be serious in the early years of a public program when potential increases in utilization in response to insurance will be constrained by shortages of supply. Understandably, dentists will tend to give preference to established patients and non-price rationing will constrain most severely those newly insured who attempt to become regular users of dental care for the first time. Since established patients over-represent upper-income classes, members of lower-income classes are more likely to find themselves paying for services they cannot receive, while upper-income patients find their costs reduced. It is hard to recommend such a public program on wealth transfer grounds, even if one belongs to an upper-income group. As for redistributional effects between patient/taxpayers and providers, this depends on the outcome of negotiations between government and profession. If, however, the ODA fee schedule were adopted as an initial basis for reimbursement, the finding by Desjardins and Lewis (1975) that in general dentists who do not use the ODA schedule charge less, would imply that average dental fees and incomes would rise somewhat. The resulting transfer of wealth from patient/taxpayers to dentists is clearly on balance from lower to higher income groups. If the expansion of dental service demand is of the order of magnitude which our estimates above suggest, then the opportunities for further income increases in dental incomes through changes in practice organization and productivity may be very large. Whether or not these increases materialize, of course, will depend on the outcome of fee schedule negotiations.

INCREASED UTILIZATION

This discussion highlights the importance of the connection between the effects of a public dental insurance program on utilization, and its wealth transfer effects. If the program fails to increase rates of utilization, then it can not be justified on grounds of contributing to dental health. At the same time, such a program which merely paid the bills for current dental care users at the expense of the average taxpayer would be considered undesirable on wealth transfer grounds. As noted above, dental care insurance has few if any risk-spreading benefits because dental care is not an insurable risk. And finally since the influence of a demand-side-only program on delivery system efficiency can be neutral at best and more likely negative (in providing a cushion for inefficiency and unnecessarily high costs), it appears that a public dental care program which does not increase utilization is significantly inferior to no plan at all. This issue was stressed in the report of the BC Children's Dental Health Research Project

(1974), in which the potential expansion of current rates of dental care utilization by children became one of the most important criteria for evaluating different alternative forms of public dental programs.

In marked contrast to public pharmaceutical insurance therefore, dental insurance or any other public dental care program is primarily justified by its tendency to increase current levels of dental care utilization and thereby to raise over-all levels of dental health. Insofar as this increased utilization represents extension of care to lower-income groups, it simultaneously weakens the argument against dental insurance on redistributive grounds. However this utilization effect generates further complications of several different types. First, it is clear from the estimates above that a truly universal program of 'optimal' dental services in Ontario would be enormously expensive relative to current levels of expenditure. Using 1975 population, dental fees and modes of organization of dental practice, optimal care for the whole population was estimated to cost $641.4 million or 157.1 per cent more than the estimated costs of $249.5 million under current utilization patterns. The more realistic estimates of utilization and cost, in the range of $390-450 million, rest on the assumption that a significant proportion of the population, about 30-40 per cent, will not become regular users of dental care even under universal insurance. Such a realistic plan, then, is open to all the above criticisms on wealth redistributional and dental health grounds. Even so, these cost estimates represent very large increases in costs over current levels.

Secondly, assuming that a public program could be designed embodying outreach or incentive-to-use mechanisms such that it could achieve high rates of utilization for the whole population, a real question of social priorities arises. Most private individuals already have the opportunity to purchase optimal dental care and obviously many of them choose not to. Insurance data indicate that a large proportion of the population will not seek regular care when it is free. Granted that there may be a social objective of improved dental health, is this social objective of sufficiently high priority to justify such a major redirection of social resources through the compulsory mechanism of the tax system?

In the case of hospital and medical services it is possible to support such compulsory redirection on several grounds. It was argued that specific sources of failure in private risk-bearing markets made it rational for individuals to choose to be controlled by a public system. Public systems of income redistribution by whatever mechanism, of course, require a compulsory element. Further, one can argue that the average consumer is sufficiently uninformed concerning the nature of his own physical state and the state of health technology as to be unable rationally to choose levels of health care in response to prices or social marginal costs. Hence society collectively acts through the agency of the health care providers to encourage or even compel the 'right' choices of care.

However, in dentistry this argument is less clear. From a dentist's point of view, a patient is healthier with a full complement of natural teeth than with full dentures. The patient probably also prefers the former condition, but as noted above, optimal dental health is much more expensive than edentulousness, and it may be quite rational for an individual, *knowing the consequences*, to choose the latter state. Poor dental health is not in general life-threatening, nor does it appear to be significantly debilitating; and it is sufficiently well-defined that an individual patient may reasonably compare it with good dental health and judge between the two on a basis of cost. A dentist may deplore the choice of poor oral health; but it is not clear that the government should compel the individual to choose good dental health – if the individual is in fact reasonably informed of the consequences of the choice. Yet justification of a public dental insurance plan on the grounds of encouraging dental care utilization amounts to just that – compelling patients to pay for additional care through taxes which in their private lives they have chosen not to purchase.

In the case of public dental insurance or dental care for children, of course, this objection does not arise. Since parents are making choices on behalf of their children, which will have long-term consequences, one may perfectly consistently argue that as in the case of education, the state has an obligation to protect the dental health of children against short-sighted or selfish decisions by parents. The improvement of the dental health of children through a public dental care program seems an unassailable objective; but the translation of this objective to the whole population does raise an awkward philosophical issue. This is particularly true when the promotion of utilization turns out to be the only justification for the program.

A third point, which perhaps arises out of the second, is that if the promotion of utilization is the primary objective, an insurance-type, denticare plan is a relatively inefficient mechanism for achieving this objective. As was noted above during the process of cost estimation, dental insurance plans pure and simple do not of themselves generate high rates of utilization. The BC report (1974) estimated that for children, insurance would raise utilization rates from 60 per cent to 70 per cent annually, thus reaching only one-quarter of the children not already under care. Our cost estimates for a universal plan assumed that 70 per cent utilization was an upper bound; in all probability an actual program would run below this level even if unconstrained by shortages of supply. The BC report suggested a fairly complex system of outreach and utilization promotion for children, which was estimated to cost about 32 cents per child in 1974, to be grafted onto an insurance-type program. However its most optimistic estimate of impact was a further increase to 80 per cent utilization. Designing such an outreach system for the whole population would be a much more complex undertaking, to say nothing of trying to estimate its effectiveness in advance. At least for children's dental care it seems generally agreed that a school-based public dental care program is capable of achieving much higher rates of utilization, 90-95 per cent, than a private practice-based insurance-type program; but again the population-wide analogue is not obvious.

Finally, as noted above, a public program whose primary *raison d'être* is the promotion of increased dental care utilization runs into the major short-run constraint that resources are simply not available. Rearranging the financing of the existing dental care delivery system is one thing, but doubling its output is another. Insofar as the present system is working close to full capacity, actual utilization increases province-wide can occur only as that system expands. The rate of growth of the dentist to population ratio is comparatively slow, less than five per cent annually in recent years and over a longer time-horizon almost static. Thus it is clear that even an energetic policy of increasing the production of dentists to expand the capacity of the dental care delivery system as organized at present could only be effective over a time-horizon of decades. In fact, of course, the capacity of the dental services delivery system has tended historically to increase by increasing the productivity of the dentist as much as by increasing the number of dentists. This development has occurred both by increasing the quantity and effectiveness of the capital equipment with which each dentist works, and by increasing the number and level of training of the auxiliaries in the average dental practice.

SYSTEM EFFICIENCY

At this point, the social objective of expanded dental care utilization overlaps with that of improved system efficiency and lowered cost. Large increases in utilization are only possible if the efficiency of the dental care delivery system is significantly increased, which in the absence of major breakthroughs such as a caries vaccine or a plaque dissolving mouthrinse, means a major expansion in the use of dental auxiliaries. Improvement in system efficiency thus becomes not only an objective in its own right, but also a precondition to achievement of the major objective of expanded dental care utilization. Such expansion is in turn necessary to blunt the undesirable redistributional effects of a public dental care program. Hence a significant criterion by which to judge a proposed public dental care program is its ability to stimulate improved productivity and use of dental auxiliaries. Such stimulation is the supply-side analogue of utilization promotion on the demand side.

On this criterion, a public insurance-type plan does not fail; but it does not do very well either. Insofar as it may serve to expand utilization, it can provide a larger market within which dentists may benefit economically by expanding their auxiliary use and productivity. On the other hand it does not provide a strong stimulus for change as would occur, for example, in a private market place where entrepreneurs who adopt improved technology can drive down prices and thereby impose powerful incentives on laggards to improve as well or leave the industry. As noted in chapter six, there appears to be an underlying economic rationale for auxiliary use to expand in areas complementary to, rather than substituting for, the dentist. In practice, this emerges in a tendency for new types of 'product line,' educational and preventive care, to be associated with more extensive auxiliary use, while the direct substitutes, auxiliaries trained to cut teeth and place restorations, encounter much more intense professional resistance. Moreover, the past record of dental fees shows no obvious tendency for productivity gains to be passed forward in reduced prices rather than backward in increased dental incomes. Desjardins and Lewis (1975) report that from 1964 to 1975 the ODA fee schedule rose by 141.7 per cent, while the Consumer Price Index rose 76.3 per cent. The dental care component of the CPI Canada wide is reported by Desjardins and Lewis to have risen only 106.3 per cent. However whichever index is used, dental fees appear to be rising faster than the price level generally. Correspondingly, net (before tax but after expenses) incomes of dentists appear to have outpaced those of the work force generally. Taxation data show an increase in annual earnings of dentists from $10,234 in 1957 (the earliest published data) to $35,406 in 1974 or 7.57 per cent per year. Over the same period the industrial composite average weekly wage has risen 5.83 per cent per year. Thus, relative to this average weekly wage, dental earnings have risen 1.64 per cent per year for seventeen years.

This suggests that the pricing structure of dentistry in the past has not been such as to impose penalties on dentists who fail to improve productivity in line with the evolution of 'best practice' technology. Such traditionalists may have foregone opportunities for increased earnings, but these foregone opportunities, as discussed in chapter six, are presumably balanced by preferences for a particular style of practice and continuation of habitual methods. Unless a public insurance program is capable of building into the fee negotiation process positive incentives for productivity improvement and penalties for failure to improve, it is probable that the process of productivity improvement will continue to grow but at a relatively slow rate. Such incentives would have to include reduction of fees for services which had been demonstrated to be within the capability of auxiliaries, whether or not practitioners chose to employ such auxiliaries. The political feasibility of such 'tight' negotiation is questionable.

This point becomes critical because, as in the case of pharmacy, dentistry appears to have reached a point where a very high proportion of the services currently provided by dentists can be delegated to auxiliaries. The Ontario 'affluent communities' studies (Canada, Department of National Health and Welfare, 1971) show that for a maintenance population routine check-up visits, radiographs, and topical fluoride application take up 34 per cent of clinical time. Hygiene instruction and scaling and polishing take up another 10 per cent, and placement of plastic restorations (mostly amalgam fillings) about 40 per cent. Auxiliaries are currently being trained to perform routine exams and to place restorations in children's teeth in a 20-month period (with no obvious reason why they could not care, at the same level, for adults as well), dental hygienists are trained to scale teeth, and certain categories of dental assistants can among other things take radiographs and apply topical fluorides after ten months training. Time requirements for dentists to supervise such auxiliaries, and particularly to confirm the diagnostic process, as well as to handle the more complex problems arising from injury, faulty growth and development, and neglect in patients not under regular care, must of course be taken into account. The exact relation between dentists and the new 'expanded function' auxiliaries is still very controversial and the issue will be explored in more detail in the next chapter. Regardless of the exact percentages which result, however, it appears that a very large proportion of current dental practice in maintenance populations is within the reach of auxiliaries. The potential thus exists for a very large expansion of productivity per dentist, out of all proportion to past trends in productivity growth.

The private practice or owner-managed enterprise, however, does not provide a setting in which such evolution is likely to occur unless over a very long time period – possibly a generation. Also, a denticare or pay-the-bills type of public dental care program provides no specific incentives to encourage this shift. Thus it seems to be weak on the fourth criterion or public objective of improving the productivity or efficiency of the delivery system, because it removes any competitive constraint on fee-setting and isolates the dental delivery system yet further from market forces. As noted above, the role of market forces does not appear to have been exceptionally powerful heretofore so this may appear no great loss. However, the apparent potential for very large increases in dentist productivity through auxiliary use, and associated reduction in dental care costs, suggests that a pure insurance-type public program may represent a serious loss of opportunities for significant improvement in efficiency by freezing in place the existing delivery system. Regulations in provincial medicare plans which limit reimbursement to procedures carried out by or under the direct supervision of physicians represent a disturbing precedent in inhibiting auxiliary use in private practice; and if these very large potential increases in dental service productivity cannot be achieved in practice, it appears obvious that the existing delivery system is not capable of supporting the very large increases in output which alone appear to justify a public dental program. Hence the necessity for exploring other forms of public dental programs as alternatives to denticare.

ALTERNATIVE PARTIAL PLANS

In the analysis of pharmacare in chapter two, several alternative ways of limiting the coverage of an insurance-type pharmacare package were suggested before chapter three began the analysis of alternative supply-side oriented programs. It was suggested that coverage could be limited in three different dimensions. A plan could be limited to sub-populations, such as children or the elderly. It could pay only a part of the bills for insured services, requiring patient participation through deductibles, proportional coinsurance, or fixed point-of-service charges. Or it could be limited to a particular subset of possible insured services. A properly designed limited or partial plan might appear preferable according to the evaluative criteria suggested above, and might also impose less of a burden on the public sector. In the case of dental insurance, however, the range of potential alternative partial plans which are not obviously inferior turns out to be rather limited.

The clearest example of inferiority is shown by partial plans which involve patient participation in payment. The usual argument for such plans is that they limit unnecessary, or 'frivolous' patient utilization. As Hall (1973, 1966) has pointed out, there is no evidence that any deterred utilization is in fact frivolous. However such 'deterrent' charges are obviously out of place in a public program whose primary *raison d'être*, as established above, is the *promotion* of increased utilization. It is a major source of concern that even a universal, first-dollar dental insurance plan may not stimulate utilization sufficiently to improve dental health and outweigh its perverse redistributional effects. *A fortiori*, a plan involving 'deterrent' charges will be even worse insofar as it achieves even lower utilization. Nor is there much ground for hoping that patient participation in payment will maintain market pressures on dental care providers to promote efficiency and limit price increases, since there is little evidence of the strength of such forces even in an environment of full patient payment.

The contrast with the discussion of pharmacare previously should be noted. In the case of prescription drugs, increased utilization in general is *not* an objective. If anything, the view is gaining strength that the health of Canadians would be improved by less use of prescription drugs. The reverse is true of dental care. A deductible plan had the advantage in the pharmacare case of 'dropping out' the majority of the population for whom prescription drug insurance has no benefits but rather net disadvantages, while targetting the small and generally identifiable population for whom drug costs are a real burden. No corresponding group appears to exist in dentistry.[7]

One twist on the patient participation approach which perhaps deserves comment is the 'incentive copayment' mechanism described as being in operation for the employees of the American Dental Association (ADA, Bureau of Economic Research and Statistics, 1973). Under this approach, irregular plan users are charged a higher copayment rate and thus a financial penalty is applied to low utilizers. Ideally such a plan would not be partial, since if the incentive copayment feature were a successful incentive, partial utilizers would become regular and no copayments would be charged. (The ADA plan had a minimum copayment even for regular users, but no purpose for this feature was ever suggested and it presumably would not be included in a public plan.)

This incentive approach seems to be open to several objections. First, it cannot be defended on equity grounds because irregular users are certainly not imposing costs on the other regular user-members of the insurance plan. While irregular users may generate more services and more dental expenditures *per visit*, the costs *per patient-year* are lower on average (see Avnet and Nikias, 1967). Or, in other words, good dental health costs more than poor dental health. Secondly, irregular use may lead to higher 'incentive copayments,' but non-use does not. The 'incentive' may encourage irregular or non-users to postpone care even longer. Finally it is not obvious that the approach worked even for ADA employees. The study reported that of those eligible throughout a four-year period, users rose progressively from 55.0 per cent in 1969 to 63.9 per cent in 1972 (remarkably low figures for a plan intended to promote regular utilization, among a population presumably more conscious than average of dental health!). However the proportion of eligible adults in each year who used the plan in the year actually fell, from 70.8 per cent in 1969 to 59.9 per cent in 1972. Dependent children had a utilization rate of 67.1 per cent in 1969, fell to 60.6 per cent in 1971, and then rose to 71.4 per cent in 1972. The authors refer to this as a 'successful' incentive program.

A second way of scaling down a universal plan could be by limiting coverage to a subset of dental services. Little attention has been given to this approach;

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[7] Disregarding, of course, the very high costs which can be incurred in cosmetic dentistry or the repair of long-accumulated neglect.

but one could conceivably provide coverage only for preventive services: examinations, radiographs, prophylaxis, and fluoride application. Or one could distinguish between minor and major restorative services, perhaps insuring placement of plastic restorations, but not crown and bridge or denture work. Many private plans implicitly make this latter distinction by imposing a higher rate of patient copayment on crown, bridge, and denture services. Such distinctions have obvious advantages on cost-containment grounds from the point of view of program administrators; but from a public perspective, if cost containment is the primary objective, no plan at all is even cheaper. 'Insuring' preventive services amounts to covering the most predictable and controllable component of care, and leaving the individual to pay for the dental services which are relatively unpredictable due to differing incidences of disease – a peculiar inversion of insurance principles. Failure to cover crown, bridge or denture services amounts to making the program non-retroactive, in that it will not reimburse repair of the consequences of previous accumulated disease. Finally, all such partial approaches tend to discourage utilization, relative to a universal plan. Patients who feel unable to bear the cost of restorative care, should they need it, may quite rationally avoid even free preventive care which might reveal the bad news. Again stressing the importance of utilization promotion in any public plan, it seems hard to justify a partial plan.

The third dimension of limitation of plan scope, which is in fact the dimension of limitation being employed by those provinces currently providing public dental care programs, is by sub-groups of the population. Dental care is provided to patients receiving social assistance, while a variety of programs for children are under way in Saskatchewan, Manitoba, Quebec, Prince Edward Island, Nova Scotia, and Newfoundland. There are several grounds upon which one might recommend this form of partial plan, particularly the children's plan; and the contrast with reasons for a partial pharmacare program are worth noting.

First of all, the wealth redistribution and risk reduction arguments do *not* apply. A pharmacare program limited to people 65 or over could be defended on the ground that this group on average bears the highest cost of drugs and is exposed to the greatest risk. The elderly are more likely to be ill and generally have lower incomes, but they are not heavy utilizers of dental care. Lewis and Brown (1973) refer to the 'familiar reversed U-shaped curve' (p. 83) when utilization is related to age, quoting the 1967 Canadian dental utilization survey as showing 33 per cent utilization rates for Canadians aged 35 and over compared with 58 per cent for 14-16 year olds, 51 per cent for 17-24 year olds, and 44 per cent for 25-34 year olds. The Ontario pattern in this survey is similar, moving from 66 per cent for 14-16 year olds to 58, 52, and finally 40 per cent for the over-35 group. Josie (1973) reports more recent data from the

WHO-ICS-MCU study – in the four areas studied; the percentages of persons with dental visits in the month prior to the study were 8.5, 11.3, 10.3, and 6.4, but for those aged 65 and over they fell to 3.1, 4.3, 3.3, and 3.5. The drop-off of utilization with age is very pronounced, although due to differences in the age grouping the 'familiar reverse U' is in evidence in only one of the four regions. Nor do elderly users tend to use services at unusually high rates when they seek care. The Ontario 'affluent communities' (Canada, Department of National Health and Welfare, 1971) study showed that (averaging male and female use) regular users aged 65 and over had annual costs in 1965 prices which were almost exactly equal to the 'all ages' average – $45.56 compared with $44.52. Costs in the age groups 55-59 and 60-64 averaged considerably higher – $68.49 and $62.39. It is in these age ranges that the major crown, bridge, and denture work appears to be done. The US data of Andersen and Anderson (1967) confirm this pattern and show the 'reverse U.' They find a general sample utilization rate of 38 per cent in 1963 (p. 46), with low points of 12 per cent in the 1-5 year age groups and 19 per cent in the over 65 groups.

It is of course possible that changing attitudes towards 'inevitable' tooth mortality with age will change this pattern. As utilization of high-quality dental care, preventive and restorative, increases among the younger age groups, tooth mortality among the aged will be reduced. As more elderly people keep their teeth, the problems and costs of providing more care to this group may well rise. Promotion of utilization has been identified as the major objective of a public program; presumably this applies to the elderly as well. These developments, however, are in the future. At present the existing evidence indicates that the over-65 population neither spend heavily on dental care on average, nor are they usually at risk of heavy dental expenditures individually. There does not seem to be a particular justification on these grounds for selecting them out as beneficiaries of a partial plan. Of course, insofar as any partial plan would represent a wealth transfer to its beneficiaries, one may advocate a dental care plan as part of a general policy of increasing the existing set of programs subsidizing the aged. However it does not appear to be a quantitatively significant part of that package and there may well be areas of higher priority.

The case is clearer for children's dental care. First, as noted above, the philosophic basis for promotion of dental care utilization is more secure than for adults. The public sector is clearly acting on the child's behalf to bias a decision by the relevant adults to devote more resources (through taxes) to the child's dental health. This is easier to defend than is direct manipulation of the adult's choices. Moreover, given that dental disease (hence dental health) is a long-term and cumulative phenomenon, care provided early in life has a longer-term payoff. Preventive care, both education and the application of fluoride, is more effective during the growth and development stage. Utilization rates tend already to be comparatively high, at least among school-aged children, so the prospects for full coverage are better. (The 'reverse U' utilization effect is pulled down by near zero utilization rates prior to three years of age and very low rates up to age 6 – see for example the early experience of the Quebec children's dental plan: Quebec, RAMQ, 1975.) The outreach problem is simplified and the additional resources necessary to achieve high utilization rates are not so impossibly large as for a universal plan. Finally, children's care, at least on a maintenance basis, requires a fairly small number of well-defined procedures. With a very few exceptions, it consists of examinations and radiographs[8], placement of plastic restorations, and prophylaxis and fluoride applications. Even this last may be questionable in areas enjoying the benefit of community water fluoridation. Hence children's care provides the optimal framework for the rapid expansion of dental auxiliary utilization, and thus the relaxation of the supply constraints which could limit the attainment of optimal utilization in a universal plan for many years.

Cost estimation for a children's dental care plan on the basis of the methodology used above for a universal plan is relatively straightforward. On the basis of the age-specific dental care expenditures reported in the 'affluent communities' (Canada, Department of National Health and Welfare, 1971-4) studies, it appears that the annual costs of providing 'optimal' care to children in Ontario aged from three to seventeen would be $85.5 million in 1965 prices, or, allowing for dental care fee increases of 86.9 per cent from 1965 to 1975 (ODA fee schedule, Desjardins and Lewis, 1975), plus 5 per cent administration cost, costs in 1975 would be $167.8 million.[9] As noted above, however, the 'affluent communities' data are based on the absence of community water fluoridation. On relatively conservative assumptions that water fluoridation would reduce the need for restorations by 50 per cent and extractions by 100 per cent, the 'affluent communities' cost estimate falls by 33.9 per cent or $56.8 million.[10] Since only 60.8 per cent of the Ontario population is reported to be consuming fluoridated water, the reduction falls to 0.608 X 0.339 = 20.6 per cent. Thus the 'optimal care' children's program would cost only 0.794 X 0.$167.8 million = $133.2 million.

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[8] This is not meant to imply that all children will require an annual full-mouth series of radiographs. In all probability most children may only require one such series if it is deemed necessary to check on the position and/or absence of unerupted teeth. The more common porcedure is to take two bitewing films annually to aid in the diagnosis of early interproximal caries between posterior teeth. The combination of very fast films, correct beam collimation, filtering, and the use of lead aprons, reduces the radiation hazard to negligible proportions.

[9] The choice of 3-17 as the age range for a children's plan is discussed in more detail in the BC report (1974). In general the older ages are included because the teenage years are a period of high caries incidence in the permanent teeth. A plan which terminates coverage too early risks devoting almost all its resources to filling deciduous teeth, and correspondingly will have substantially less effect on the long-run state of the permanent dentition of program 'graduates.' Dunning (1968) makes this point strongly.

This of course represents 'optimal' utilization; as noted above the prospects of achieving virtual 100 per cent use by any representative population are negligible. The BC Children's Dental Health Research Project (1974) estimated on the basis of private insurance data that 70 per cent utilization was a reasonable expectation – since the 'optimal' care level above was only 98 per cent utilization, a 70 per cent level would lower costs to $95.1 million. This of course would still leave a relatively high proportion of children receiving irregular care or no care at all. The BC report specified a fairly complex outreach and recall system combining data from the central insurance agency, schools, and the local public health units with a mail and telephone follow-up which was hypothesized to be capable of raising utilization to 80 per cent at a cost of 32 cents per enrolled child. If, allowing for inflation and differences in costs, we raised this even to 40 cents in Ontario, on a base of 2,239,589 children, such an outreach system would only cost $0.9 million. An 80 per cent utilization rate would generate dental service costs of $108.7 million for a total program of $109.6 million (Table 4).

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10 This 50 per cent reduction in caries incidence is a 'ballpark' estimate of the benefits from community water fluoridation. Estimates from a variety of studies turn up different numbers but most are in the neighbourhood of 50 per cent or above. The full benefits, of course, take some years to develop. A 50 per cent reduction in restorations (and 100 per cent in extractions) translates into only a 33.9 per cent reduction in total dental care costs because restorations and extractions are only a part of the total range of dental services. Diagnostic services, for example, are assumed not to be reduced at all. If for example, restorations made up 50 per cent of total dental care costs, water fluoridation would reduce total costs by 25 per cent. There is, however an additional gain because topical application of fluorides to children's teeth need no longer be carried out in areas with water fluoridation. This saving added to the reduction in restorative care leads to the 33.9 per cent estimate.

It must be admitted, however, that a reduction in the incidence of caries will not *necessarily* lead to reduced placement of restorations. Practitioners may simply revise their criteria for restorative care. The linkage between epidemiologically measured decay and clinically provided restorative care is not close. Similarly in a private-practice, fee-for-service delivery system dentists may well continue to provide topical fluoride applications despite water fluoridation. One may also expect that suppliers of fluoride compounds will continue efforts to market such products.

TABLE 4

Estimated total costs of a private practice based denticare program for children aged 3-17 years (Ontario 1975)

Type of coverage	Costs ($ million)	Percentage of child population (3-17 yrs) benefitting
Child population, full insurance (optimal level of dental care)	133.2	98
Child population, full insurance (optimal level of dental care services for users and expected utilization response to insurance)	95.1	70
Child population, full insurance (optimal level of dental care services for users and active outreach program to increase utilization)	109.6*	80

* Includes $0.9 million for the outreach program

NOTE: All costs include a 5 per cent administration cost

A partial insurance-type program, however, raises serious questions concerning the fee negotiation process, the introduction of new types of auxiliaries, degree of participation by dentists, and the related degree of access to care, geographic or otherwise, by children. There are now several studies in Canada dealing with the relative efficiency, accessibility, and utilization levels, of an insurance-type, private practice based children's dental care plan compared with alternative public programs. Since this discussion takes us into the area of non-insurance public programs influencing the supply side of the dental care delivery system, it will be the subject of the first half of the next chapter. The second half will attempt to extend the discussion of alternatives to denticare for children into the adult system, relying in part on US productivity data for general dental practices.

5

Denticare and its alternatives: reshaping the delivery system

INTRODUCTION

The major strategies, or classes of public policies, which are alternatives to an insurance-type, private practice based denticare system appear to fall into two categories. Direct public provision of all or a part of the range of general dental services represents a process of governmental involvement on the supply side of the delivery system as well as the demand side, and policy options for such intervention have been explored in a number of recent Canadian studies of public, school-based children's dental care services. Alternatively, one could structure policies to increase the degree of competitiveness and the role of market forces generally in directing resource allocation in dental care. Such policies would require limitation or partial dismantling of the range of private governmental authority now delegated to professional associations of dentists, and are clearly incompatible with universal or even widespread first-dollar insurance coverage, whether public or private. Such competition-enhancing policies, which would presumably apply to the whole range of adult and child dental services, have not received much attention from health planners. The revival of interest in Canadian competition policy, and its relation to the position of the professions generally, however, indicates that these issues are receiving increasing attention in the wider sphere of public policy.

The passage of Bill C-2 extending the Canadian Combines Investigation Act to cover services as well as goods remedies a gap in Canadian law and policy in this area (Canada, Department of Consumer and Corporate Affairs, 1976). Section 32 of that Act, proclaimed on 28 January 1976, and applicable to service industries as of 1 July 1976, prohibits agreements to lessen competition among suppliers of services, including agreements on prices, outputs, or production facilities (Canada, *Combines Investigation Act*, 1976). As Ostry (1976) points out, 'there is a good deal of uncertainty regarding the precise implications of Combines law for the professions.' Restrictions on 'dissemination of information' (especially advertising) and collusive price-setting, however, are two obvious forms of collusive professional behaviour lessening competition to which Ostry draws attention. These two practices, as she notes, are similarly under attack in the US, where the Supreme Court in *Goldfarb* v. *Virginia Bar* has ruled that price-fixing (by a state bar association) comes within the provisions of federal anti-trust laws. Professional bans on advertising may be challenged either on anti-trust grounds, or as violations of the constitutional right of freedom of speech. As noted below, the removal of these restrictions might not in itself be sufficient to shift the private practice, fee-for-service based dental delivery system in the direction of improved efficiency and effectiveness. But such removal by no means exhausts the possibilities of a competition-oriented public policy toward dental care.

The exploration of public policy options in children's dental care, and in particular the balancing of public insurance with private provision against direct public provision, was initiated by the Saskatchewan *Proposal for a Dental Program for Children in Saskatchewan* (1972). This later formed the basis for the report of the Saskatchewan Advisory Committee on Dental Care for Children (1973). Romcke and Lewis (1972) reported on the Prince Edward Island dental manpower study of expanded function dental auxiliaries in both public children's clinics and private practices. Lewis and Brown (1973) considered manpower requirements in Canada under four different private or public situations, private finance (direct payment or voluntary prepayment) or public prepayment, with or without use of dental therapists working along with dentists to supply restorative services. The Manitoba Committee on Children's Dental Health Care (1973) issued a report on public provision of preventive dental care. In 1974 the BC Children's Dental Health Research Project issued a report detailing the mode of organization, expected costs, and manpower requirements with associated training system and costs, for four alternative modes of providing a universal children's dental care program for that province. In 1975 the Quebec Ministry of Social Affairs issued a working document, *Programme de Santé Dentaire en Milieu Scolaire* detailing a school-based public delivery system for that province, and subsequently issued a comparison of that model with a private fee-for-service public prepayment model and a lightly sketched mixed model in *La Santé Dentaire au Québec* (May, 1976). Also, several provinces and dental associations have carried out unpublished studies at different levels of comprehensiveness and sophistication.

In the meantime, Saskatchewan and Manitoba have commenced school-based public delivery programs, Quebec and Nova Scotia have established private practice-based public-prepayment programs. Each of these is being phased in slowly by age-group, starting with the youngest children and working up. In addition, Newfoundland, New Brunswick, and Prince Edward Island have provided dental services for certain child age-groups for several years. Initial data have emerged for the first two years' experience in the Saskatchewan and Quebec plans, and, while by no means conclusive, such early experience forms a useful test of the general conclusions in the numerous studies cited above.

CHILDREN'S DENTAL CARE

There are really only two major options for public policy in providing dental care for children, although a third has sometimes been created by combining components of these two, and each of the major options has a number of associated variants whose operational significance is by no means trivial. However, the principal policy decision turns upon whether the existing private practice delivery system run by individual self-employed dentists should be relied upon to provide all or most of the dental services required by children in a specified region and age group and financed by a public program, or whether a public provincially administered service using salaried dental personnel should be created for the task.

The private practice option permits variants, as noted in the previous chapter, with respect to types and frequencies of service reimbursed and relative rates of reimbursement. In practice most private insurance programs impose periodic frequency limitations on such services as radiographs and exclude other services of ill-defined benefit in order to protect themselves and their enrollees against over-servicing by dentists. A public program, while reimbursing 'general dental services,' would presumably do likewise. Similarly a private practice based program might reimburse all or only part of a patient's bill, might or might not permit the dentist to bill the patient above a negotiated fee schedule, and might reimburse either patient or dentist. Since any form of direct payment by patients inhibits the expansion of utilization which, as noted above, is the critical justification for a public dental program, it is generally assumed that any such program would follow the medicare model and reimburse the dentist at agreed rates, with no billing of the patient. However, dentists have pointed out that professional enthusiasm for direct billing of the patient with subsequent reimbursement by the program is not solely due to the opportunities this creates for billing at above negotiated rates or providing non-reimbursed services. The high expense of practice component in the dentists' fees (45-55 per cent) makes delayed reimbursement much more of an economic burden than it is for other health professionals. Public reimbursement agencies are not always noted for prompt payment.

Options also exist with respect to the optimal design of a public service program. In particular, a choice must be made between siting small clinics in the schools and setting up larger, more centralized establishments. Mobile clinics are also an option. The frequency of performance of specific services such as routine examinations, radiographs, and prophylaxis/fluoride becomes a policy variable (not merely the setting of upper limits). The auxiliary/dentist mix and the choice of specific auxiliary functions and levels of supervision become critical factors in plan design, and the dental delivery system literature provides a dearth of settled conclusions (though a corresponding surplus of firm opinion) in these areas.

The mixed or intermediate option studied in the BC report (British Columbia, 1974) consisted of regular and universal preventive care (prophylaxis and fluoride) provided in the school system by teams of salaried auxiliaries, while diagnostic examinations and restorative care were carried out by private practitioners under public insurance. More recently the Quebec Ministry of Social Affairs (1976) has also suggested an intermediate plan which sounds similar to that of BC but in fact appears to locate diagnosis (at least in the sense of identifying deviation from norm) in the schools with the salaried teams. In the BC intermediate program all children would be expected to go to private dentists for examinations, radiographs, and restorative care; in the Quebec plan it appears that only children needing restorative care will actually contact private practitioners. The differences in cost implications, particularly for a maintenance care population which, as in Quebec, is assumed to be consuming fluoridated water and hence has a relatively low restorative workload, are enormous.

The fundamental criteria which appear to distinguish these options from each other, at least in the studies done thus far, are attainable utilization rates, patterns of auxiliary use, and the controllability of procedural frequencies. The first issue relates to the capability of different programs to reach out to members of the child population not now receiving care, and hence actually to improve the general health status of that population. The second, use of auxiliaries, relates to the economic efficiency and cost of different programs insofar as optimal use of auxiliaries trained to perform clinical examinations, give anesthetics, and prepare cavities and place restorations can lower program costs significantly by economizing on the use of highly-trained and expensive dental manpower. Moreover it bears on the attainable program utilization level, since the capacity of the dental care delivery system to expand to provide additional childrens' services is enhanced if it relies primarily on auxiliaries with a two-year training period rather than dentists with a seven-year lead time. This consideration is particularly critical insofar as the extension of private dental insurance expands adult dental care demand and places increased pressure on the scarce supply of dentist time. Finally, frequency of performance of particular services, particularly diagnostic, educational, and preventive services, can become a critical factor in comparing different plans. Optimal rates of performance are, within certain ranges, based more on clinical opinion than on experimentation or research findings. Such opinions as to optimal frequency, however, seem to outrun the frequencies actually provided to patients receiving 'optimal' care as reflected in the 'affluent communities' surveys (Canada, Department of National Health and Welfare, 1971-4) of what dentists actually do for their patients. A public delivery system which embodied the 'optimal' standards of theory, rather than current dental practice – e.g., two examinations per child per year, high rate of time input for nutritional and oral hygiene counselling – could be a very expensive program indeed because the preventive effects of such intensive servicing are, to be generous, uncertain, but the costs are not. Possibilities for procedural multiplication also exist, of course, under a private practice based plan; the 'affluent communities' frequencies are for populations with ample financial resources but self-paying. It is quite conceivable that under a public insurance program such concepts of optimality might shift. Marcus *et al.* (1975) in the context of a study of productivity in US private dental practices, point out (p. 214): 'It is therefore not only the cost of care but a given practice's view of what constitutes care that needs to be taken into account when studying productivity.' They find that variations in such concepts from practice to practice generate significant differences in costs per patient or per visit. Thus the possibility of public program-induced shifts in such concepts cannot be discounted.

UTILIZATION LEVELS

On the attainment of maximum utilization levels, most studies of children's dental care have concluded that the advantage lies with a public, school-based delivery system. As noted above, the BC report (1974) found that a private non-profit first-dollar insurance plan covering children in BC had attained annual utilization levels of only 70 per cent. This, of course, is in an area relatively well-supplied with dentists. The report hypothesized that an energetic outreach program could raise this to 80 per cent, but that was felt to be the maximum attainable by an insurance-type, private practice plan. The 80 per cent estimate was derived from examination of the experience of an outreach program which had been carried on in certain regions of the BC interior by one of the provincial regional dental consultants, promoting certain preventive services financed by the provincial government – 80 per cent represented not average but best regional results. Examination of data from private insurance companies, e.g., Avnet and Nikias (1967), Ellis (1970), or the ADA employees plan (1973) referred to above, seems to confirm that 70 per cent is a reasonably optimistic estimate for a private practice plan. In interpreting private insurance data, it is important to recall that records are often kept by subscriber, not by eligible insured, and a dependent child may not be counted until his existence is revealed by use of services. Also, beneficiaries moving on and off private insurance by reason of unemployment, lay-off, or job change, are likely to schedule dental care use into insured periods. These sorts of statistical problems can bias upwards reported utilization rates.[1]

By contrast, school-based plans are believed to generate utilization rates in the 90 per cent and up range. The BC report assumed for planning purposes a utilization rate of 90 per cent, noting that the New Zealand school dental service attains rates of utilization in the mid-90 per cent range and the Oxbow pilot project of school dental care in Saskatchewan also attained rates above 90 per cent. It must be kept in mind, of course, that such rates are very sensitive to specific age groups covered, particularly in the early years of a program. Rates of utilization tend to be lower for pre-school children and late teenage children because a school-based system forms a weaker outreach tool in these age groups. Thus a plan covering six- to twelve-year-olds, for example, has a built-in advantage over one covering children from three to eighteen regardless of program site and structure.

Preliminary data from the Saskatchewan school-based dental program and the Quebec private practice system strongly confirm the superiority of the former in generating utilization. The Saskatchewan plan reports (Saskatchewan Dental Plan, *Annual Report*, Aug. 1975) that 76.1 per cent of six-year-olds contacted in the province have enrolled in the plan – 10,924 out of 14,347. Also in the Oxbow region the continuing program contacted 3059 children aged 3-5 or 7-17 and of these 2146 or 70.1 per cent enrolled. Of this total of 13,070 enrollees,

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[1] The recent Waterloo time, cost and manpower study of incremental dental care for pre-school children (Lewis, Magid, and Jarrett, 1975) achieved much higher utilization rates for a private practice based prepayment plan, in the range of 80-98 per cent for various groups and years with an over-all average of 89.2 per cent. This was a defined experimental group, however, subjected to extensive outreach and knowing themselves to be part of a study. The parents of this pre-school group had a unique chance to secure free dental care for their children 'for a limited time only' – this in addition to the 'Hawthorne effect' probably explains the unusually high rates of utilization.

12,490 or 95.6 per cent had received oral examinations between 1 September 1974 and 31 August 1975. Moreover, the total of 75.1 per cent of contacted children clearly represents a high proportion of previous non-users of care, since the average number of decayed teeth per child (deciduous and permanent) was 5.01. The average number of filled teeth (deciduous and permanent) per child was only 1.10. Thus it appears that the SDP is reaching those children who do not regularly use the private practice dental system and whose care therefore presumably represents the primary justification for a public plan. The 24.9 per cent of the child population not enrolling in the plan (of whom only 1.2 per cent explicitly refused to enroll) probably includes a high proportion of children already connected to the private practice system and therefore using dental care regularly. We do not know what the utilization rate of this group is, but if it is as high as 60 per cent then the total dental care utilization rate for the target group of children in Saskatchewan has reached 90 per cent in the first year of the SDP.

Second-year SDP utilization data confirm the success of the plan in reaching previous non-users (Saskatchewan, 1977). Of those eligible to enrol in both years, participation rose from 76.1 per cent in 1974-5 to 85.2 per cent in 1975-6. The newly eligible groups in 1975-6 enrolled at a rate of 80.6 per cent. The number of decayed deciduous and permanent teeth among new enrollees continues high, again indicating that the population being served includes many who would not otherwise have received services since they were not receiving regular dental care prior to joining the plan.

By contrast, the first eight months' experience of the Quebec program shows relatively low utilization rates. As reported (Quebec, RAMQ, 1974), the eligible child population in Quebec aged seven years old and under numbered 793,486 and of this group only 136,686 or 17.2 per cent used services. This number is of course very low because it includes a high proportion who do not generally use services under any plan. Among the six- and seven-year-old groups, utilization rose to 29.7 per cent and 39.8 per cent, or on average (weighted) 34.9 per cent. This is of course an eight-month figure; if one assumed that participants would be added at the same rate in the next four months one would estimate an annual utilization rate of 52.4 per cent. In fact, the MAS paper '*La Santé Dentaire au Quebec*' reports first-year utilization for three to seven year olds as 42 per cent, an increase of 63.4 per cent above the eight-month figure for this group of 25.7 per cent (Quebec, RAMQ, 1975). Using this higher rate to expand the eight-month data to a year, we would estimate 57.0 per cent as the first-year utilization rate for six- to seven-year-olds in Quebec. However, recently released data (Quebec, RAMQ, 1976) show that during a full year of coverage (1975) by a private-practice, fee-for-service plan, utilization rates for six- and seven-year-olds in Quebec were only about 40 per cent (84). This suggests that 57 per cent is too high, and/or that utilization rates have *dropped* significantly after the initial year's experience. In either case, it underscores the inability of insurance-type mechanisms to shift dental care utilization or non-utilization patterns.

Not only is this well below the Saskatchewan rate of 75.1 per cent for the Saskatchewan Dental Plan, it is also an inclusive rate for the whole province. The SDP rate must be increased as noted above for the proportion of children who continue to receive care from private practitioners. On relatively modest assumptions about this rate among the non-enrolled children, the estimated province-wide Saskatchewan utilization rate reaches 90 per cent. Moreover, the service structure of the two plans suggests that the Quebec private practice plan is serving predominantly the children who already had access to care, exactly as studies such as the BC report predicted for a denticare-type plan. The Quebec program reported that for the six- and seven-year-old children, in the first eight months of operation, 166,875 amalgam and anterior fillings were placed. This works out to an average of 2.24 for each of the 74,541 participants in those age groups. By contrast, the SDP identified an average of 5.01 teeth needing restoration in each child seen, and placed 46,629 amalgam and composite fillings in 12,490 children receiving oral examinations or 3.73 per child. Thus the SDP seems to have handled about 74.5 per cent of its first-year workload backlog. Yet a higher proportion of the Saskatchewan population consumes fluoridated water, and the federal study of dental health in the Canadian provinces, 1968-70, conducted by National Health and Welfare (quoted in Quebec, Ministry of Social Affairs, November 1976) showed the average state of child dental health in Quebec to be significantly inferior to that of Saskatchewan. The fact that the 57 per cent of children *receiving care* through the Quebec plan appear to be in better dental health than the SDP beneficiaries further supports the view that the Quebec plan is not extending the dental delivery system to the non-users.

An obvious explanation of this inadequacy is the severe 'shortage' of dentists in Quebec – the 1974 Canada *Health Manpower Inventory* shows a 1973 population/dentist ratio of 3531:1 in Quebec (active, licensed dentists) compared with an average for Canada of 2851:1. But the Saskatchewan ratio is even higher, 3991:1. This emphasizes that in dental care, as throughout health care, the availability of *services* depends not only on the availability of dentists (or physicians, or pharmacists) but on how practices are organized and particularly on the patterns of auxiliary use.

The Quebec program data also illustrate another major stumbling block in the path of any efforts to expand dental care utilization on the basis of a private practice/public insurance program. The regional distribution of dentists in Quebec, as in every other province, is heavily concentrated in urban areas. This pattern is associated with higher rates of utilization, particularly in Montreal, where the average utilization rate for children aged 0-7 in the first eight months of the plan was 19.7 per cent compared with 14.3 elsewhere in the province. For the six- and seven-year-olds the rates were even more sharply divergent, 40.2 per cent in Montreal and 28.4 elsewhere. The Montreal utilization, raised by the estimated 63.4 per cent (see above) to reach a full year rate, becomes 65.7 per cent, or about average for a private practice based private insurance plan. The sub-district of Montreal-Île in the heart of the urban area reaches the even higher rate of 49.0 per cent over eight months or (estimated) 80.1 per cent for a year – almost exactly equal to the BC report's (1974) highest estimate of utilization attainable under an insurance-type plan.

These marked differences in utilization rates across regions may be due either to socio-economic differences in the population served, or to differences in the availability of services. House (1970) argues that in a private practice system such causes are interdependent in that dentists locate where there is a market. In addition of course locational preferences of dentists, like those of other professionals, lead them into urban areas and reduce the availability of services elsewhere. Regardless of the causal mechanisms, however, it is clear that any program which hopes to increase levels of utilization outside metropolitan areas must find a way of assuring the availability of personnel. It has been suggested that a private practice dental program can do this by making practices more economically viable in currently underserviced areas; against this it must be noted that if such a program is successful in increasing utilization significantly it will also open up more opportunities in currently (relatively) well-serviced areas. In the short run, then, until supply expands as well, such a program could actually induce dentists to move *into* the currently better serviced metropolitan areas and make the geographic imbalance worse.

Roos *et al.* (1976) have addressed the question of geographic distribution of physician manpower in Canada: 'does a major increase in the supply of physicians alleviate inequalities in the distribution of physicians across provinces or between rural and urban communities?' and on the basis of Canadian experience from 1968 to 1974 answer 'a qualified "no"' (p. 187). This represents a combination of an insurance-type program (medicare) combined with a major supply increase; *a fortiori* an insurance program by itself would not have improved distribution. And if geographic inequities cannot be solved, then generally high utilization rates cannot be achieved. The SDP form of public delivery system, by contrast, appears to be able to meet these problems. Although a regional distribution of utilization is not given, the over-all rate is so high as to preclude widespread areas of inadequate access; and the fact that 95.6 per cent of enrolled children received oral examinations, and 75 per cent of identified caries were filled in the first year, suggests that regional supply constraint problems are not serious.

THE ROLE OF DENTAL AUXILIARIES

The second critical distinction between public insurance and public delivery of children's dental care is the different role of dental auxiliaries in the two types of program. The heavy reliance on auxiliaries enables a public program, in principle, to provide care at significantly lower cost. It also, as noted above, permits the expansion of capacity much more rapidly than is possible in a dentist-based system, which is an important aspect of the problem of increasing utilization levels. The analysis of auxiliary use, however, and of its role in cost estimation and practice efficiency, requires some delineation of the various key types of auxiliaries and the way they interact with each other and with a dentist in a practice setting. The methodology of certain studies of dentistry which lump all dental auxiliaries together into a single category can be exceptionally unhelpful in that it blurs some of the major features of this problem.

Essentially, a dental auxiliary may be defined by the mix of specific procedures she (or he, but almost always she) is trained to perform. The definition of different procedures or tasks can be quite precise. Filling a tooth for example, involves a whole sequence of procedures of varying complexity from 'greeting the patient' to 'administering anesthesia' and 'preparing the cavity' (drilling). Moreover, procedures can be combined to define auxiliaries in a number of different ways. A detailed description of a 'ladder' of dental auxiliaries is provided by the career options system (COPS) of the BC report (1974), which in turn is based in part on the work of the Canadian Dental Association Conference on Dental Auxiliaries held at Banff in 1974.

For our purposes, however, four categories of auxiliaries are relevant. The dental assistant may be trained on the job or for up to 10 months in a post-secondary institution. This auxiliary carries out basically 'extra-oral' tasks – such as setting up and cleaning the operatory, passing instruments, taking and developing radiographs, and perhaps office work. Some provinces have created the CDA, certified dental assistant, who is allowed to perform certain 'intra-oral' procedures such as taking impressions for study models, cleaning the teeth (not scaling), and then applying topical fluorides. The specific function definitions vary from province to province. At the next level, the 'expanded duty dental auxiliary,' or EDDA, may be trained to place, carve, and finish restorative materials in a cavity prepared (drilled) by someone else. Since the placing of restorations forms such a significant part of general dentistry, and particularly children's dentistry, (the Ontario 'affluent communities' studies

(Canada, Department of National Health and Welfare, 1971) report 40.5 per cent of time requirements for the whole population and 49.2 per cent for children aged 0-16 were taken up with placing plastic restorations), the extension of auxiliary capability to include a significant part of this very large component represents a major potential increase in output per dentist relative to practices using only extra-oral, or 'non-expanded' auxiliaries. A critical factor at this stage, however, is that the EDDA like the CDA must work directly with a dentist or other more highly-trained auxiliary. Someone else must perform examination and diagnosis, administration of anesthetic, and preparation of the cavity. The question of supervision of these auxiliaries does not therefore arise in an acute form since a dentist is presumably close at hand.

The next two categories of dental auxiliary, the dental hygienist and the dental nurse or therapist, are trained to have an independent therapeutic capability. The dental nurse trained for twenty months and able to perform clinical examinations, administer local anesthetics, and prepare as well as fill cavities, is the backbone of the school-based dental delivery program on the Saskatchewan, New Zealand, Australia, etc. model. Her (his) functions include almost all of children's dentistry for maintenance populations (except orthodontic treatment). In such programs the salaried dentist performs initial diagnostic examinations when each child enters the program, periodic re-examinations every few years to monitor growth and development, and stands ready to handle the referred complex or emergency services which appear on the basis of Saskatchewan experience to be remarkably few. In addition, of course, the dentist has continuing responsibility for general supervision and quality control. The dental hygienist, by contrast, performs primarily periodontal functions – tooth cleaning, scaling and polishing, care of the supporting tissues of the teeth, and dental education. In Prince Edward Island's dental care plan for children, specially-trained expanded function hygienists are utilized to perform in addition to their own duties those duties noted above for the EDDA. Adult patients, for whom periodontal disease is the major threat to dental health and whose restorative needs are primarily extension or replacement of existing restorations, could in principle receive most of their care from the hygienist. Since she (he) does not perform diagnosis or prepare cavities, however, the independence of the hygienist is limited. In practice the hygienist's role tends to become blurred with that of the CDA (scaling below the gum line and cutting soft tissue shades into supragingival cleaning and fluoride application). Since the EDDA and dental nurse are recent developments (at least in North America), and since periodontal care has until recently not been emphasized in general dentistry, the tendency of some researchers to lump hygienists and dental assistants together has some basis in dental practice. But it would be a most unsound guide for the future, as the utilization of the EDDA and dental nurse are critical to the efficiency and scope of children's dental programs. Periodontal disease in children is rarely of such seriousness as to require the skills of the hygienist in any case, education and supra-gingival polishing are within the capability of other auxiliaries and advanced periodontal care is primarily an adult problem.

The optimum mix of dentists and auxiliaries for a children's dental care delivery system has been approached in the Canadian literature through two different methodologies which fortunately give roughly similar results. The more common method, used in the Saskatchewan and Quebec studies and the work of Lewis and Brown, proceeds by specifying the annual procedural workload required by a given population – examinations, radiographs, restorations, etc. – and then translating these into total required chairside minutes for each type of procedure. Then, using definitions of the procedural capabilities of each type of dental personnel, these can be translated into annual hours of personnel time of each type required. Given an assumed annual output of chairside hours per dentist or auxiliary, this in turn defines the over-all manpower requirements of the program. The BC study employed a somewhat more involved technique, using a dental practice computer simulation model developed by Kilpatrick *et al.* (1972) in which hypothetical patients with particular reasons for visit flow through a practice defined by its numbers and capabilities of personnel. Given the relative mix of service needs in the population, the optimum capacity for a given size of practice can be worked out and the total workload capacity of different types of practices with different auxiliary mixes can be established. Using this approach one can allow for a certain randomness of actual times required for different procedures and can examine the resulting problems of scheduling different types of personnel. These become more serious in a general dental practice with a wide range of presenting problems, particularly if several different types of auxiliaries must be co-ordinated in caring for a given patient. The model and its use are described in more detail in the BC report (1974), and the source documents are Kilpatrick *et al.* (1972) and Kisko *et al.* (1973 a, b).

The BC study concluded that the optimal practice size for a children's program was a two-operatory unit staffed by one dental nurse and two CDA-type dental assistants, operating under the general supervision of a dentist in a ratio of nine such units to each dentist. If each dentist had one dental assistant for periodic examinations, and two for more complex care, the total auxiliary/dentist ratio for the program covering all BC children age 3-17 was estimated at 28.5:1. The size of this ratio, compared with current dental practice averages of between two and three auxiliaries per dentist, highlights the major shift in dental delivery patterns embodied in such a program, although it is also partly reflective of the nature of children's dentistry. The more complex and 'dentist-intensive' services of crown and bridge, partial dentures, and endodontics are not required. Similar ratios emerge in the Saskatchewan (1972) proposal, a dental assistant to dental nurse ratio of just over two to one, nine dental nurses per dentist, for a total of 29.5 auxiliaries per dentist, in spite of the fact that the general methodology for arriving at these estimates, and in particular the sources of the estimates of productivity for each type of personnel and time requirements per procedure were quite different. The Quebec study (1975) generates the same aggregate ratio, 29 auxiliaries per dentist when the plan is fully phased in, but postulates a somewhat higher ratio of dental nurses or 'hygiénistes thérapeutiques' to dentists (eleven to one) and only 1.6 assistants per dental nurse. This reduction may be due to the decision of the Quebec planners to discontinue application of topical fluorides after the entire child population has been exposed to community water fluoridation, hence reducing the need for dental assistants. Also in moving from the planning to the field stage, the Saskatchewan program has moved to an approximate one-to-one dental nurse/assistant ratio. This apparently reflects a strong program emphasis on dental education by the dental nurse both in the classroom and on a personal counselling basis with children. The optimal mix for clinical services may be two assistants per dental nurse, but if the dental nurse spends half her/his time in an educational role, the optimal team would be one to one.

The BC report (1974) also evaluated several other combinations of personnel which do not appear in the other Canadian literature. If, for example, it were felt that appropriate supervision required a dentist to be physically present at any clinic where children were being treated and that all examination and treatment planning should be carried out by a dentist, the optimum clinic size for children's dentistry becomes very large. The dentist should work with three dental nurses, five assistants, six operatories, and two secretary/receptionists for an auxiliary/dentist ratio of 11:1. This model approximates what a private practitioner might achieve if Dental Practice Acts were changed to permit use of dental nurses and if he (she) specialized in children's care. A public program along such lines would require about three times as many dentists on staff as does the smaller clinic system with dental nurses performing the regular clinical examination; moreover scheduling becomes a greater problem with three levels of clinical personnel at work. Also, the very large scale needed for optimal delegation with a dentist in each clinic implies that clinics are too large to be based in schools (or portable) and that children will need to be transported to the clinics from schools. The impact of such transportation upon utilization rates is open to question.

The BC study also examined the use of the EDDA in a children's dental program, and found that the more limited delegation pattern sharply increases the need for dentists. The optimal ratio appears to be five auxiliaries per dentist when the EDDA is substituted for the dental nurse. Tested but not reported were 'super-combinations' of dentist, dental nurse, EDDA, and CDA. These turned out not to be efficient because the scheduling problems involved with the dentist diagnosing and perhaps anesthetizing, the dental nurse cutting cavities, the EDDA filling, and the CDA helping everyone were just too complex for one small patient. Also, as noted, the dental hygienist had no obvious role in a children's program where dental nurses provide educational services and CDA's perform prophylaxis and fluoride application. The dentist-EDDA teams led to a program specification with nearly six times as many dentists as that based on school clinics with one dental nurse and two assistants as the basic unit, and was estimated to be nearly 10 per cent more costly on an annual operating cost basis. Moreover, scheduling requirements led to the optimum clinic size being determined (by the simulation model) as two dentists plus associated auxiliaries, a scale of operations which again is too large for a school clinic and requires a transportation system to bring in children from a large market area.

PROGRAM COSTS

The development of over-all program cost estimates for a public, school-based, children's dental care service obviously varies from province to province depending on the estimated productivity, salary cost, and assigned target procedural frequencies for the dental service. The assumed state of community water fluoridation is also important. The BC report (1974), for example, reported pessimistic estimates on the basis of no further progress in water fluoridation and then attempted to adjust these for gains from fluoridation, while the Quebec program assumed that by the time the program was fully implemented all children would have grown up on fluoridated water. Moreover the cost comparisons with a private practice depend critically on whether the corresponding private practice program is costed out on the basis of externally defined standards of optimal care matched against prevailing fee schedules, or whether estimates are made of the level of servicing which private practitioners are actually likely to provide to patients under continuing care. As an example of this latter effect, the Quebec program cost estimates (after full program implementation) are $30.04 *per capita* for a school dental service (1975 dollars) compared with $74.14 for a private practice-based system. But actual annual costs of the program in operation in 1974-5 were $50.56 per child participating in the program (Quebec, Ministry of Social Affairs, 1976, 9). The more detailed eight-month data in the 1974 annual statistics of the RAMQ (1975) show an average of $52.74 with six- and seven-year-olds at 5.99 per cent higher or $56.09 – applying this ratio to $50.56 yields $53.59 per participant as estimated annual costs per six- and seven-year-old participant. This still implies an estimated cost advantage of (30.04/53.59 = 0.5605), 44 per cent for the school dental service, and it should be kept in mind that the $30.04 estimate is for the child population from kindergarten to high school while the private practice $56.09 is for six- and seven-year-olds only. (The participant group appears as noted above to be predominantly a maintenance-care population). Still, part of the cost advantage is being dissipated by a planned frequency of visits for the school dental service which is above the norm for private practice.[2]

The Quebec study (1975), calculates that a school-based children's dental service would cost only 40.5 per cent of the costs of a private practice system providing the same care, i.e., the same utilization rate and procedural frequency ($30.04/$74.14). The Saskatchewan program projections (1972) yield a similar ratio. The long-run costs per participant are estimated at $32.49 (1972 dollars) or including 15 per cent depreciation on capital, $33.88, for a total program cost of $4.7 million; elsewhere it is estimated (without detail) that a similar private practice plan would cost $11.5 million. The public service thus costs 40.8 per cent of the private. The BC report estimates a smaller advantage to the public service – assuming 90 per cent utilization in both cases and including education costs a 3-17-year-old program is estimated to cost $53.7 million (1974 dollars) compared with school-based clinic program costs of $33.3-34.0 million, or about 62-63 per cent of the private practice cost.[3] The report emphasizes, however,

[2] The source of the 'two visits per year' orthodoxy is obscure. Dentists recommend this frequency with assurance because, presumably, that is what dental schools teach. But Lewis (1974) in particular has recently questioned the value of such frequencies, and pointed to the total lack of any underlying justification in preventive effect. The BC report (1974) likewise found no justification for this, and used one check-up visit per year as the standard for the public dental service. 'Affluent communities' (Canada, Department of Health and Welfare, 1971, 1974) and insurance data suggest that dentists in fact provide an average of slightly more than one examination per year to patients under continuing care.

[3] The estimates vary depending on the forecast working life of the auxiliaries, particularly the restorative dental therapist (dental nurse, hygiéniste thérapeutique). Initially one might expect training costs to be higher in a private practice based program because training periods for dentists are so long and expensive. However, dentists have a much longer working life than auxiliaries, about thirty-five years compared with (very shaky) estimates of five to ten years for auxiliaries in the BC report so that fewer need to be trained in any year to replace depreciation of a given force in the field. The training costs under either system turn out to be relatively small on a continuing basis, however ($1-2 million in the BC plans). The long working life of the dentist and the very heavy investment required in training facilities are in fact program disadvantages, of course, if rapid increases in the stock of dentists are desired for a limited time only; auxiliary training programs are much quicker to gear up and down.

that the private practice program is not expected to reach 90 per cent utilization; most optimistic anticipated results are 80 per cent utilization costing $45.5 million and leaving twice as many children unserviced. Associated costs per participant are $58.28-59.21 (1974 dollars) for the school-based clinic in BC and $93.99 for private practice on the assumption of 90 per cent utilization.

The BC estimates are higher than the others, and the cost advantage of the school-based clinics is smaller, for several reasons apart from differences in time-period and fee schedule. First, all costs for capital equipment and space are included. Dental fees must include allowance for these costs; therefore, to avoid biasing the comparison, an allowance is included in the school program as well. If, as in Saskatchewan, schoolroom space is under-utilized, the school program cost would be lower. Also training costs of all personnel have been included; these are not usually added to program operating costs. Costs of separate school programs of dental education are also added in. As noted above, private-practice costs are based on actual rates of performance of procedures, not theoretically optimal rates. Finally, adjustments have been made (downward) to productivity estimates in the public service to allow for travel time between schools (particularly in rural areas), scheduling problems, and school holidays – factors which weaken the theoretical link between chairside hours available per provider and hours of 'need' in the population. Also the private-practice program with 90 per cent utilization includes costs for a transport service bringing children from schools to dental offices in order to achieve that utilization. (Whether or not this could work in practice is an open question.)

The BC estimates, implying more conservative but nevertheless very large savings (between 35 per cent and 40 per cent in *per capita* costs) from a school-based clinic, may be the more realistic of this group. As noted above, the Quebec program estimates are only 44 per cent below actual private practice experience, and they may be optimistic. Also the $11.5 million private-practice cost estimated in Saskatchewan in 1972, or $82.90 per child, looks far too high. An 'affluent communities' study for Saskatchewan is not available, but (1971 dollar) costs per child for children aged 5-14 in 'affluent communities' in Alberta and Manitoba were $34.62 and $37.72 respectively per person-year exposure (Canada, Department of Health and Welfare, 1974). The utilization rates in these areas are substantially lower then in the corresponding Ontario study, about 84 per cent in Alberta and 83 per cent in Manitoba, which means that these represent $41.21 and $45.45 per annum per user, and a further allowance must be made for price differences from 1971 to 1972 and between Saskatchewan and its neighbours. But no plausible adjustment could come close to the $82.90 *per capita* estimate implied by the $11.5 million over-all private practice program cost. It would appear that a very 'rich' service package was being costed.

In this context, the cost data from the first two years of operation of the Saskatchewan Dental Plan (1 September 1974 to 31 August 1976) are interesting and encouraging, but do not permit a proper check on long-run cost estimates (Saskatchewan, 1977). The first-year costs per child served were very high – $158.29 per child enrolled. The reasons for this are many and well known; they include building of clinics and acquisition of administrative and salaried dentist staff in the initial year to meet capacity requirements of the full program, high travel costs as the program is phased in by school grade, high initial backlog of need, time required to explain the plan to parents and school personnel in its initial year, lower productivity of recent graduates. There is no scarcity of valid reasons for a high start-up cost. Second-year costs are down sharply, to $107.86 per child, which taking account of a year of inflation represents a fall of nearly 40 per cent in constant dollars. The second-year program has tripled in size, from one grade to three, so it still represents a high proportion of initial-care patients with need backlog as well as a significant cost for travel time and introduction of new personnel. The results are thus very encouraging in showing the expected rapid drop in cost per child served with the potential for substantial further reductions to come. They are consistent with and lend significant support to the various study projections of important efficiency advantages for an auxiliary-based public service over private dental practice. But they do not yet provide a test of the various projections of long-run costs per child in such a program.

In trying to apply this experience to Ontario, we can begin from our earlier estimates of the costs of a private practice program. It was estimated that 'affluent communities' level care on an estimated 1975 population base of 2,239,589 children, using 1975 ODA dental fees, with 60.8 per cent of the population consuming fluoridated water, 5 per cent administrative costs, and assuming a 70 per cent utilization rate, would cost $95.1 million or $60.66 per user in that year. If a school dental service could achieve 90 per cent utilization and reduce costs by 35-40 per cent, then such a program could cost $95.1 × (9/7) × (0.60-0.65) = $73.4-79.5 million. Annual savings would be in the neighbourhood of $15-20 million and the effective impact of such a program on the dental health of the child population would be significantly greater.

Alternatively one could attempt to build up the program specifications and costs of a school dental service for Ontario on the basis of the same type of computer simulation modelling as was carried out in BC, or by the process of calculating needed chairside hours of different types of auxiliaries as in Saskatchewan and Quebec. The former appears on the basis of estimates reported above to be the more conservative procedure.[4] The BC simulations estimated the annual capacity of a three-person, school-based dental clinic team with two operatories as 1470 children per year (seeing each child once annually) in the 5-14 age group, but only 1350 if the full 3-17-year-old group was covered.[5] In addition, dentist and auxiliary teams of different composition were required to carry out the limited amount of complex treatment which was beyond the capacity of auxiliaries, and to carry out initial and periodic inspections of children participating in the program.

A critical difference between the BC and Ontario populations, however, is the absence of community water fluoridation in the communities from which BC were drawn. If we extend these data to Ontario, upward adjustments of the child/team ratio need to be allowed for the better state of dental health and lower incidence of dental decay in Ontario. The adjustments made to the 'affluent communities' data above, consisting of the reduction of amalgam restoration workloads by one-half and the elimination of extractions completely, had the effect of lowering total workloads by 34 per cent. The impact on a public service system should be greater, as the application of topical fluorides can be discontinued;[6] and this procedure is assumed to be carried out much more frequently in public dental programs (once per child per year) than actually occurred in the Ontario 'affluent communities' data. In part this represents a change in dental practice over time – the 'affluent communities' data are now about ten years old on average. If one applied the same adjustments to the Saskatchewan chairside time requirements (derived from the Oxbow project) for maintenance care, annual minutes of dental nurse time required per child fall from 50 to 35 or by 42 per cent (Saskatchewan proposal, 1972, 13). The Quebec proposal assumes that the dental nurse performs prophylaxis, and includes a significant component of hygiene instruction in chairside time, leading to a pre-fluoride maintenance care requirement per child per year of about 100 dental nurse minutes, adjustments as noted above lower this by about 23 per cent (Quebec, Ministry of Social Affairs, 1975, Table XIIa) but if prophylaxes were performed by the CDA and oral hygiene instruction moved from clinic to classroom as in the BC proposal the fluoride adjustment would be from 64 to 41 dental nurse chairside minute per year, or a 36 per cent reduction in workload. The BC estimates of fluoride impact were a reduction in workload of 25 per cent from fewer restorations, plus 5 per cent from discontinuance of topical fluoride, or about 30 per cent over-all. Putting these together, a range of 30-40 per cent reduction in workload seems about right for the impact of a 'mature' water fluoridation program. Since 60.8 per cent of the Ontario population has this benefit, the average workload reduction for a given Ontario population relative to BC would then be 18-24 per cent.

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[4] The detailed results of the simulation of school-based dental clinics in BC are presented in chapter seven of the BC report, but other relevant material and basic assumptions are laid out in chapters three and six. The simulation model itself is described in chapter fifteen.

[5] These ratios may seem somewhat high relative to New Zealand's experience of about 500 children per dental nurse. It is important to remember that each dental nurse or dental therapist in the BC simulations uses two operatories and aides, so that restorative dentistry is four-handed and preventive care can be carried on simultaneously by the second aide in another operatory. High speed equipment also increases productivity relative to the New Zealand system. Moreover, productivity rates are for a 'mature' system with children on maintenance care and with most dental personnel having several years of experience.

[6] This may be a contentious issue. The Saskatchewan proposal assumed continuation of topical fluorides regardless of water fluroidation and the SDP provides this service. The BC report raised the issue, and worried about it, on the ground that the additional cariostatic benefit from topical fluorides in a fluoridated community, if there is any, is not large enough to justify their application. The Quebec proposal (1975) finally comes out (56) and states that topical fluoride is not necessary in fluoridated communities.

This calculation yields an estimate of annual child workload in each school dental clinic of 1350/(0.82-0.76) = 1646-1776. Again, if these seem large, it should be noted that on the basis of the experience of Toronto with water fluoridation (Lewis, 1976) a high proportion of children at any examination will be caries-free. For such children, annual care consists of examination by the dental nurse, radiographs taken by the dental assistant and examined by the dental nurse, and prophylaxis by the assistant. With two operatories and two assistants, rates of throughput for the clinic can be very high indeed.

On this basis, with a child population of 2,239,589 children aged 3-17 in Ontario in 1975 with 90 per cent participation, the total number of school clinics required would be (0.9 X 2,239,589)/(1776-1646) = 1135-1225. This, in turn, is the required number of dental nurses in the field, certified dental assistants would have to be twice this amount plus an allowance for the dental treatment teams. Estimated annual cost of each such team in 1974 (salaries, equipment and supplies) was $41,970, raising this by 10 per cent for inflation yields $46,167 and the annual operating costs for school-based restorative clinic teams in an Ontario program then become $46,167 X (1135-1225) = $52.4-56.6 million.

This forms the backbone of the program. Dentist teams, however, are estimated at about one per 18,000 users for the procedures beyond the competence of the dental nurse team and one per 28,500 users to perform periodic inspections. The treatment team workloads, adjusted for water fluoridation, become 21,951-23,700; the check-up teams do not adjust. Again very large apparent loads arise because very few children in any year will actually need to see a dentist for treatment while the inspection teams in a mature program should contact each child every three years. This leads to dentist team requirements in Ontario for (0.9 X 2,239,589) = 2,015,630 participants, of 85-92 for treatment and 71 for inspection, a total of 156-163 salaried dentists needed. Treatment teams were estimated to cost $60,560 annually in 1974; check-up teams $44,845, adjusting these by 10 per cent for inflation and multiplying by total team requirements yields costs of dentist services of $9.2-9.6 million.

To this must be added costs of operatory space and equipment, although the opportunity cost of the space may in fact be zero if schools are becoming less crowded. The BC program calculated this at about $5.50-6.00 per participant annually; again adjusting by 10 per cent this leads to an estimated cost in Ontario of $12.2-13.3 million.

Putting all these together yields an operating cost estimate for a hypothetical Ontario program of $73.8-79.5, but an additional allowance must be made for administrative overhead expense. In the BC program, a flat rate of 20 per cent was assumed. Saskatchewan reports actual experience in its first year of operation significantly lower than this, an additional 17 per cent of program expense net of capital cost was spent on administration. This in turn is believed to be unusually high because administrative capacity is being set up to run the whole program and is being spread over only the six-year-old expenses in the first year. A 10 per cent administration over-ride may thus be more realistic, yielding total estimated program costs for an Ontario school dental service (1975) of $81.2-87.5 million; or $40.29-43.41 per participant. These program costs are not far below the estimates for a private practice based program derived above ($95.1 million); the key difference is that it is estimated to reach 90 per cent of the population annually rather than 70 per cent. Looked at another way, the public service plan reduces the group of irregular participants or non-users by two-thirds, and costs about $10 million less per year. Costs per participant are about 66-71 per cent of the estimated corresponding costs for a private practice based, insurance-type children's dental program, $60.66 above.

PROCEDURAL FREQUENCIES

These program cost estimates depend in a very important way upon two assumptions or classes of assumption, concerning the behaviour of procedural frequencies and unit costs under the two types of programs. With respect to the private practice based program, it is assumed that procedural frequencies in private practice will not start to increase in response to the introduction of the public program, and that the process of negotiation of fee schedules will be sufficiently tight to prevent fee increases in response to the expansion of demand. Corresponding and parallel assumptions are made with respect to a public delivery system; the cost estimates developed above rest on the assumptions that clinical examinations are annual, that topical fluorides are not applied in areas with water fluoridation, and that the program personnel are engaged in providing clinical care rather than in classroom education or personal counselling. On the procedural cost side, either low productivity per auxiliary or unusually high rates of increase of public sector salaries could lead to effective increases in the unit cost per procedure performed. Each of these assumptions represents the 'holding constant' of a variable or set of variables which have the potential to create administrative problems of cost control.[7]

With respect to the private practice program, as noted above, the definition of what constitutes 'optimal' dentistry has a degree of flexibility and can vary from practice to practice. It is certainly possible that procedural frequencies will rise when patients are not paying the bills, particularly for 'counselling' and other preventive procedures of dubious efficacy. Quebec data suggest that this may be happening; the first eight months' experience show a rate of 8.741 procedures per participant aged six or seven years old. An 'affluent communities' study for Quebec is not available, but the Ontario rate for children aged 5-9 was 6.004

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[7] The difficulty of controlling procedural frequencies is one of the main arguments against the mixed public/private system, of prophylaxis and topical fluoride in the schools; diagnostic examination and restorative care in private practice. The BC report indicated that such a program would be intermediate in cost between a pure private and a pure public plan, $46.0 million annually as compared with $53.7 million for a pure private plan and $33.3 million for school clinics, all at 90 per cent utilization. But these estimates depend critically on the assumption that dentists would in fact cease to perform prophylaxis and fluoride application in their private offices. If instead, significant numbers of dentists chose to reperform such services on the ground that the school service was inadequate, for example, and to bill the patient, total program costs would rise and political pressure for reimbursement of such services in private practice would become acute. The private practitioner is in a very powerful marketing position. In any case the *raison d'etre* of the limited school service is a bit obscure in regions with community water fluoridation. The Quebec report, *La Santé Dentaire au Quebec* (1976) suggests that a mixed system could in fact be less costly than a public dental service. But it does not spell out the anticipated frequencies of procedural performance in each type of practice. In fact, from the cost estimates, it appears that the school service will perform the clinical examinations and that only children with diagnosed caries will visit a private practitioner. This is of course very different from the BC mixed system; but its viability may be questionable. If private practitioners see the school system as competitive, the referral of carious children to their practices gives them an obvious opportunity to take counter-measures.

services per person-year exposure or 6.126 per person-year. The major differences are with respect to preventive services, which may reflect the shift in emphasis in dental practice over the past decade as well as the effects of insurance. For six- and seven-year-olds, preventive examinations, teaching, cleaning, and fluoride application made up 22.1 per cent of procedures and 29.0 per cent of total costs in the Quebec program. However extractions make up 11.9 per cent of services and 8.3 per cent of costs in this program, at a rate of 1.1 per child, which is extraordinarily high for what appears to be a maintenance care population. The 'affluent communities' rate in Ontario was about 0.3 per person-year in the 5-9 age group, and the SDP experience for a population with a relatively high backlog of caries is also 0.32 per child examined. Given the age group, these are almost all deciduous extractions, and the question of unnecessary procedures for billing purposes obviously arises. The Nova Scotia children's dental insurance program has run into the same sort of trouble, and has begun placing a variety of specific limitations on the frequency of performance of preventive procedures. 'Hygiene instruction' as a benefit has been discontinued, and efforts are being made to evaluate preventive care in terms of its impact on dental care costs. (Canadian Dental Association, 1976).

On the other hand, unnecessarily high and rigid standards of procedural frequency can be equally costly for a public dental service. BC estimates assume one annual examination, but it was calculated that semi-annual visits would raise the patient load of the restorative teams by about 26 per cent. Using the Ontario program costs calculated above, this would add $20.2-21.8 million to program costs for extra school clinic teams (including administrative overhead at 10 per cent but assuming no new operatory space was needed). No extra dentist teams would be required. As previously emphasized, this would lead to a procedural frequency well above that observed in private practice, for no obvious benefit. Similar problems could arise if counselling/educational services represent a large component of public program cost. The justification for providing such services is presumably their impact on dental health and the incidence of caries or periodontal disease, not the satisfaction or sense of well-being they yield for providers. But the substantive benefits of such services have yet to be documented. The BC report (1974) emphasized the potential of a public dental service as a research environment in which such preventive programs may be evaluated and kept, modified, or discarded. However if this does not happen, the public service could incur unnecessarily high costs to maintain 'preventive' programs from which there was little or no payoff in terms of reduced clinical workload, simply as a result of bureaucratic inertia.

Both systems also present problems on the unit cost side. Apart from the need to control procedural frequencies, the public agency administering a dental insurance plan will face continuous pressure over time from dental associations to move fee schedules up, just as happens now under medicare with physician associations. A significant difference emerges, however, in fee negotiation over a partial plan. In the medicare case, bargaining is symmetrical. Physicians' only source of income (almost) is the provincial medicare program, while provincial governments and their populations can only get medical services from physicians. Neither can do without the other for more than a very short time, creating great pressure to reach agreement. On the other hand, a children's dental care insurance program would represent only about one-third of the income of an average dentist. The ability of a provincial dental association to 'take a strike' by withdrawing services during negotiations would be greater than that of the provincial negotiating agency which has no other source of dental services. Moreover, whatever fee schedule was negotiated would apply to children's care only. Insofar as genuine negotiation and compromise occur, such a schedule would presumably be lower than that promulgated independently by provincial dental associations for adult care. The result might well be a shift by individual dentists from child to adult care, particularly if the latter is being financed by an expanding private insurance sector. Parents unable to get access to dental care for their children would then be told that dentists 'cannot afford' to give children's care because the provincial government does not pay its 'full cost.' The political difficulty of maintaining effective fee control over a partial insurance plan would be quite severe.

On the other hand, public sector salaries in recent years have also grown at rates which have attracted increasing attention. The difficulty of holding down fee inflation must be balanced against that of limiting public sector salaries, and any attempt at a quantitative guess would be foolhardy in the extreme. What can be pointed out, however, is that procedural unit costs in a public service delivery system depend both on the salary levels and on the clinical productivity of personnel. The 'conventional wisdom' is that salaried clinical personnel are less productive in terms of procedures per time period (to which the standard rebuttal is 'higher quality'). Doherty and Hussain (1975) have recently shown in a comparison of private dental practices and a public clinic service based on salaried dentists that costs were lower in the latter, both per patient and per patient visit, for a group of 15,000 children studied over three years; but these results mingle price and productivity effects. They do show, however, that even in the absence of extensive auxiliary use a salaried service is not necessarily more costly.

Still, productivity does not have the automatic built-in incentive that it does in private practice. Commenting on this problem the BC report (1974) suggested that separation of the clinical and counselling/education arms of a public program might be desirable in order both to monitor and promote clinical productivity and to evaluate the impact of the more general preventive service. The Saskatchewan Dental Plan has chosen instead to combine the two and to use dental nurses in both clinical and educational roles; it remains to be seen whether or not this will lead to administrative problems in maintaining clinical productivity and/or whether it will have significant preventive benefits.

In this context one should also note the results of a recent quality-assessment study of the Saskatchewan Dental Plan (Saskatchewan, 1977). Outside expert assessors in blind trials reported that the quality of the restorations placed by the salaried dental nurses was on average significantly higher than those placed by community dentists. The criteria of restoration quality are intended to reflect, among other things, probabilities of redecay, or loss, or breakdown of the restoration. Thus better quality work, which may take more time per procedure in the short run, should lead over time to a need for fewer procedures. Of course, this advantage may not show up until the child has already left the program.

ADULT CARE

In marked contrast with the state of research on children's dental care in Canada, little or no attention has been given to potential variations in the structure of the dental care delivery system for adult patients. A number of specific research projects have been carried out at the level of the individual dental practice, dealing with the actual and potential impact of conventional or expanded function auxiliaries on practice productivity and unit costs, but these studies have not been pulled together to try to generate over-all estimates of what an 'efficient' adult delivery system might look like or cost. Equally important, little attention has been given to the questions surrounding how one might move from the present delivery system to one which was more efficiently organized and less costly – if indeed such a change were thought to be worthwhile. No parallel exists in the adult world to the school system as a framework within which to provide care and to encourage utilization. Nor for that matter does the literature provide the same relatively consistent picture as it does for children's care of the potential efficiency benefits to be gained from a massive increase in the auxiliary/dentist ratio through a public delivery service. In this section we shall briefly touch upon the literature on auxiliaries in general dental practice, without attempting anything close to a comprehensive survey, in order to gain an idea of the possible orders of magnitude of the economic benefits from increased auxiliary use. We shall then outline the difficulties which may prevent these potentialities from being realized, a discussion which relates closely to the reasons for the diversity of findings in the literature. The various strategies or policy stances which the public sector might take up to overcome these difficulties will then be described and assessed in very broad terms, and the relationship between these and a policy of universal public dental insurance noted. In general, however, the adult dental care area appears to be one in which a great deal more analysis and research is needed; and we shall be pointing to problems and possible lines of investigation rather than reaching settled conclusions.

The Prince Edward Island Dental Manpower Study (Romcke and Lewis, 1972) explored the use of EDDA-level auxiliaries placing and carving restorations in cavities prepared by dentists in public children's clinics. In addition, however, the new types of auxiliaries were placed in six private dentists' offices for a three-month period each and in two offices for a twelve-month period. It was found that productivity increases in terms of output per dentist were significant, but not as great as in public clinics, and that it was not possible to measure precisely the reduction in the cost per unit of treatment. In public clinics, one EDDA increased output per dentist by 73 per cent and two increased it by 106-134 per cent, making possible unit cost reductions for treatment of about one-third. The corresponding output increases were only about 50 per cent in the private practices studied, and unit cost reductions are not specified.

As noted in the PEI study, these results are quite similar to earlier experiments in the Royal Canadian Dental Corps which have been recently surveyed by Moore (1973) and compared with the proposed Saskatchewan plan. The RCDC results are of course also in the context of public clinics with salaried personnel, however, and the PEI study brings out a significant problem in applying similar results in private practice. Much of the productivity difference between public and private practice was due to a lack of adequate dental equipment and an insufficient number of dental assistants in the private offices (p. 51). In other words, efficient use of expanded duty auxiliaries by a private dentist requires a major capital investment and a reorganization of the whole practice flow to accommodate a much larger patient load. This appears to limit their acceptability to private practitioners, though acceptability by patients appears not to be a problem.

Even more variable results on productivity from the introduction of EDDAs into private practices in Ontario are reported by Ellis *et al.* (1975). It appeared that in half the offices studied, productivity did not increase and in some it decreased due to 'inappropriate use of the auxiliaries and their skills,' 'restricted by office policy.' Confined only to the restoration of prepared cavities, the EDDA often had considerable idle time and was not permitted to carry out other preventive and educational functions for which she was also trained. Ellis *et al.* also found that physical limitations in offices reduced productivity gain; the existing number of operatories imposed a bottleneck on patient flow. Since the use of the EDDA was a short-term experiment, private dentists quite rationally did not invest in capital expansion. However since operatory space was fixed, output could not expand significantly. Hence the productivity gains were disappointing. This 'catch-22' situation could be especially misleading if one concluded as a result that productivity gains with new auxiliaries could not be achieved in practice! Ellis *et al.* also noted that dentists were able to reduce their chairside time by using EDDAs while producing the same amount of dentistry. In fact, 'This seemed to be the major return for the dentist within the scope of the project' (72).

The same problem of very high variability in the productivity-enhancing impact of new types of auxiliaries emerges in US studies. The study prepared for the US Health Resources Administration on effects of task delegation on the requirements for selected health manpower categories (Department of Health, Education, and Welfare, 1974) surveyed this literature and concluded that: 'The relative productivity increase which can be realized by a dentist in the office setting as a result of delegating tasks is a stronger function of the *number* of auxiliaries employed by the dentist than it is a function of the staffing pattern' (39). This was described as a 'fundamental assumption,' and is probably a fair description of past experience at relatively low auxiliary/dentist ratios. This last is of course critical – as the auxiliary/dentist ratio rises, further productivity gains depend upon some at least of the auxiliaries being trained to a wider range of tasks. The US HRA study, however, reflects in this 'basic assumption' the same point that Ellis *et al.* make directly. If major structural and managerial reorganizations of the dental practice do not occur, the more advanced skills of the expanded function auxiliary will be wasted. Associated with this, the study makes disturbingly low estimates of the acceptability of expanded function auxiliaries to US dentists. By 1990, low, median, and high estimates are that 10.0 per cent, 15.0 per cent, and 32.9 per cent of dentists would in fact be using expanded function auxiliaries. Thus on even the most optimistic estimates, potential productivity gains would have to be diluted by two-thirds.

More recently than the effects of task delegation survey, Redig *et al.* (1974) reported the first-year results of a California experiment with EDDAs showing similar variations in output increase. Comparing first-year results across each of four practices with a baseline, pre-EDDA quarter, Redig *et al.* found that patient visits per eight hours of dentist time rose 33.8 per cent for a solo dentist using two full-time EDDAs, 5.3 and 29.2 for two solo dentists with one EDDA each, and 13.0 for a three-dentist group using two part-time EDDAs. The gross billings and total restorations per eight hours of dentist time rose by larger percentages than this in each office, however, indicating that more work was being done per visit as well. Estimated net incomes per eight hours of dentist time went up sharply; 81.3, 40.5, 31.4, and 41.2 per cent.

Since the study reports estimated gross and net dollars per eight hours of dentist time, before and after, it is possible to compute by how much prices could have fallen if the entire efficiency gain were passed on to consumers instead of being captured by providers. For example, in Practice (1) gross billings per eight hours in the baseline quarter were $511, and averaged over the first year of the experiment, $727. Estimated net dentist receipts were $187 and $339. If net receipts had stayed at $187, gross receipts could have been reduced by (339 – 187) = $152 per eight hours or a (152/727) = 20.9 per cent price reduction given the new higher workload. A similar computation for the other three practices yields 15.5, 12.2, and 11.4 per cent respectively. Moreover, these potential reductions represent first-year effects; as the experiment continues the dental practices will gain in managerial experience and the EDDAs in proficiency. Any further gains in productivity will translate directly into dentist net income and/or potential fee reductions, since estimated expenses have already been met.[8]

The possibility of future gains as practices become more experienced in using expanded duty auxiliaries is suggested in several sources. Unpublished estimates by the BC College of Dental Surgeons based on the Kilpatrick simulation model used in the BC report suggested that if all BC dentists were making optimal use of EDDAs (with associated additional operatory space and assistants) and if the utilization of dental services expanded appropriately, the BC dental fee schedule could be cut by over 30 per cent without reducing average dentist net incomes. The College expressed considerable scepticism about the simulation, possibly as a result of preliminary field results from the Ellis *et al.* study, but that study has documented fairly well the reasons for its limited productivity gains. The 30 per cent fee cut is quite close to PEI's estimate of a one-third reduction in unit costs of services, and more recently the American Dental Association, Bureau of Economic Research and Statistics (1976) has issued a Memorandum (193/76) on Productivity Analysis indicating that one dentist with one EDDA and two operatories is 33.6 per cent more productive than with one chairside assistant and two chairs, presumably with very similar expenditure levels.

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[8] Or into fewer chairside hours for the dentist, as noted by Ellis *et al.* The Redig *et al.* study (1974) showed that actual dentist hours fell in all offices using EDDAs, by 7.3, 2.0, 5.2, and 4.3 per cent.

Moreover it must be kept in mind that (almost) all such dental practice studies have measured the impact of EDDAs, dental auxiliaries who can place and carve restorations in pre-prepared cavities. Less attention has been given to the use of the dental nurse in adult care, yet for patients under continuing care whose initial diagnosis has been made by a dentist, there is no obvious reason why the dental nurse should not handle the whole process of placing plastic restorations (amalgams and anteriors). While such services are not as large a proportion of adult dentistry as they are of child dentistry, they remain very important. According to the Ontario 'affluent communities' data (Canada, Department of National Health and Welfare, 1971) plastic restorations actually rise to 55.49 per cent of treatment time requirements in the 20-9 age group, fall to 41.68 per cent for the 30-9 group, but never go below 25 per cent for any age and sex group except males over 65. The more complex crown, bridge, and complete and partial denture restorations reach a peak of 51.1 per cent of time requirements among 55-9 year olds, but are never above 20 per cent for patients below the age of 55. Moreover as adult dentistry increases its emphasis on periodontal and other preventive care, the proportion of services within the capability of the hygienist will expand; and insofar as such care is effective in reducing tooth mortality, the over-all crown, bridge and denture workload should fall. Patients who keep their teeth longer will need more plastic restorations, not bridges. Thus adult dentistry seems to show the potential for a very large expansion of auxiliary use, as periodontal auxiliaries (hygienists) and restorative auxiliaries (dental nurses) have the capability to provide most of the necessary care.

As noted above, it would be highly speculative to prepare a quantitative estimate of the impact such a major reorganization of dental practice could have on unit costs and fees. Experimental experience with the limited function EDDA suggested that 10-20 per cent reductions in unit costs would be conservative; extensive development of restorative and preventive auxiliaries may well make possible reductions in the 30-40 per cent range. This would probably involve dentists working with at least one dental nurse and one dental hygienist, each with a chairside assistant, so that auxiliary/dentist ratios might be in the range of 5-10 rather than the current 2-3; and the optimum practice scale is obviously much larger than at present. The necessary changes in dental practice would be revolutionary, but the potential benefits correspondingly huge. If 'optimal' dental care for all Ontarians in 1975 might cost $640 million, the potential cost-savings through optimal auxiliary use are thus in the range of $192-256 million per year.

Emphasis throughout has been on the word 'potential.' These numbers are 'guesstimates,' some might say wildly optimistic, about what could be achieved in the best of all possible worlds.[9] The wide variation in actual experimental results and the discussions by Ellis *et al.* (n.d. [1975]) have highlighted the very serious problems which exist in getting from 'here' to 'there.' In particular, acceptability of auxiliaries by dentists is limited (this, not patient acceptance, seems to be a real problem). As discussed in chapter six there are a variety of economic reasons why practice expansion through auxiliary use may not be in the best interests of the individual dentist or of dentists as a group. And practice expansion must go along with auxiliary use. Since the stock of dentists is fixed in the short-run and cannot be reduced, very large increases in productivity require very large increases in utilization. In adult dentistry, it is not clear how these could be achieved.

Moreover, existing dentists in Canada are trained to do and are comfortable with restorative work. The realization that most of their current activity is within the capacity of an auxiliary with two years training (and a female at that!) is very threatening. Many dentists are not equipped to take on what would amount to specialization in the performance of the more complex and challenging tasks of dentistry, even though it is those tasks which primarily justify extensive training programs. For younger dentists, such specialization might be a much more stimulating role than running a 'filling station,' but established career patterns are hard to change.

Finally, insofar as greater auxiliary use and productivity increase can be achieved, what mechanisms will lead this to be translated into lower fees rather than higher net incomes and/or lower working days for dentists? Both the Ellis *et al.* and Redig *et al.* studies cited above observed a reduction in dentist work effort as auxiliary use increased, which is exactly what the standard economic model of the self-employed entrepreneur (developed in some detail in chapter six) predicts. And studies by Doherty and Hussain (1975), Maurizi (1969, 1975), and P. Feldstein (1973) have concluded that dentistry as an industry generates above-market rates of return for dentists due to its non-competitive characteristics. There is thus ground to fear that productivity increase is likely to result in higher dental incomes rather than lower prices. As noted above, this appears to have been the case in Canada over recent decades. And given the highly politicized environment of health care in Canada, such a development is more likely if productivity gains come slowly and imperceptibly than if they are sudden and dramatic. This would seem to argue, from the point of view of professional self-interest, for a slow and prudent introduction of auxiliaries. Many studies should be carried out, changes should be made carefully and gradually, so that the resulting income increases are never large enough in any time period to attract political attention. The appropriate public policy in such a situation is not at all clear. Here we shall only sketch in several possible general strategies, and emphasize that the whole area needs a good deal of analysis.

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[9] Second best. In the best world no one's teeth ever decay, periodontal disease has disappeared, and unemployment among dentists is a serious but short-run social problem.

The most obvious change in the policy environment of dental care at the present time is the extension of the federal Combines Investigation Act to cover dentistry along with other service industries. This Act is of course criminal law, quite independent of the aims and intentions of health providers and policy planners. 'The public is entitled to the benefit of free competition, and the prohibitions of the Act cannot be evaded by good motives. Whether they be innocent and even commendable, they cannot alter the true character of the combine which the law forbids...' (Taschereau, J., in the Howard Smith Paper Mills Case, quoted in Canada, Department of Consumer and Corporate Affairs, 1976, 23). The intention of these changes is to promote through the mechanism of free competition among providers precisely the types of changes in delivery system described above; lower prices, improved efficiency (in the case of dental care, more use of auxiliaries), and wider availability of services. Collective agreements by professional associations to set uniform fee schedules, to bring pressure to bear on non-conforming members, and to forbid or restrict advertising of, *inter alia*, service prices by members would appear henceforth to be illegal conspiracies subject to heavy criminal penalties.

The probable effectiveness of this straightforward anti-combines strategy, however, is open to doubt.[10] It is not clear that present price-coordination practices in dentistry will in fact be illegal. A ‘suggested’ price schedule, clearly identified as optional and non-binding may be quite acceptable. Given such a guide, together with a clear understanding of their mutual economic interdependence, members of an industry have been shown in the past to be quite capable of behaving in a ‘consciously parallel’ manner which involves no conspiracy. Stanbury and Reschenthaler (1976), in analysing the Armco case, describe the process whereby key executives of firms in the Ontario metal culvert industry undertook a deliberate strategy of ‘education’ of the firms in this field. The adoption of an ‘open price’ policy (each firm publishing all of its prices and making them available to all competitors) was combined with extensive discussions of the disadvantages (to the industry) of price competition. In describing the emergence of a pattern of conscious parallelism, they suggest: ‘It may take several “failures,” but on one attempt the mixture “jells” and the firms adopt common prices’ (23).

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[10] In addition, of course, there is the traditional objection to free competition in the health services sector – the risk of quality dilution. There is a genuine public-interest reason for dentistry's professional status, as well as the private interests of dentists. Patients are not generally able to evaluate their own need for care or the quality of the care they have received. A more competitive strategy seems attractive in pharmacy precisely because the dispensing act, as opposed to the drug itself, is sufficiently well defined and standardized that the patient can be expected to evaluate it and to respond to price signals in choosing dispensers. The average patient cannot see into his own mouth, and would not be helped much if he could. Thus some form of public program of quality assurance, probably including inspection and relicensure, would be a necessary adjunct to such a competition policy in order to ensure that lower costs were achieved by greater efficiency, not quality reduction. Whether such a necessary adjunct would also be sufficient is another issue. The BC report (1974) recommended a public quality assurance program regardless of what other choices were made for children's dental care, on the ground that far too little was known about the quality of dental care produced by the present dental delivery system. This supports Ostry's (1976) point that the public interest in quality cannot be shown to be well served by present systems of self-regulation and licensure. If quality control is a public objective, there are more reliable ways of achieving it which are less costly in terms of the inefficiencies resulting from collusive behaviour.

In the case of dentistry, however, the common pricing pattern is already set. The strong professional corporate identity and the ‘ethical’ traditions against competitive behaviour create an ideal environment for conscious parallelism. Moreover the benefits to an individual dentist from embarking on a low price, high volume strategy may not be very large. As noted above, the relatively sluggish response of utilization to dental insurance programs suggests that the response of the aggregate demand for dental services to price cuts is probably lower than the −1.5 to −2.0 yielded by cross-sectional studies. Thus a price-cutter could benefit only by taking patients away from other dentists. But, in Ostry’s (1976) words, ‘the members of professional groups are led to think of each other not as competitors but as colleagues,’ and one is likely to be inhibited in a direct attempt to undercut the livelihood of one’s colleagues. Thus, even in the absence of direct professional control over pricing or advertising behaviour, the conscious parallelism of the dental profession would probably suffice to prevent aggressive competition, particularly if the economic gains for individual dentists were small or highly uncertain. And the major structural changes required to make optimal use of auxiliaries would require very aggressive competition indeed.[11]

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[11] It is interesting that we are led in dentistry to the same conclusions reached by Moore (1976) in analysing the probable impact of the new anti-combines policy on the real estate industry. Here we have a large number of ‘professional’ individuals in a market with over-capacity and uniform, excess prices. Moore concludes, however, that the recognition of common interest will enable this group to prevent the emergence of competitive behaviour even under the new act. *A fortiori*, then, one would anticipate that a much more highly professionalized and restricted group such as dentists would be able to develop informal methods of co-ordination which are not touched by the act.

A further critical factor in the promotion of an anti-combines approach to the problem of dental care delivery is the role of auxiliary utilization. The possibility of a low price, high volume strategy depends on the ability of a dentist to expand auxiliary use in the way described above. At present, provincial dental societies have authority under provincial statutes to block such utilization. This authority may not be touched by the new act. The so-called 'realtors' clause,' section 32(6) permits 'conspiracy, combination, agreement or arrangement relat(ing) only to a service and to standards of competence and integrity that are reasonably necessary for the protection of the public.' Reasonable necessity obviously requires judicial interpretation. Alternatively, one might well argue that the power of a professional association to set procedural capacities for and to license auxiliaries is exercised under a provincial statute and that for these purposes dentistry is provincially 'regulated.' If the activity in question is 'authorized and effectively administered' (Canada, Department of Consumer and Corporate Affairs, 1976, 28) by provincial law then the Act does not apply. This area also appears unclear; Ostry believes (15) that the Act can apply to 'bodies which have received their authority under provincial statute,' but not in respect to 'activities which are expressly authorized by statute.'

It would appear from the foregoing that a provincial policy, expressed through legislative changes, will be necessary to supplement the federal anti-combines policy by relaxing professional controls over auxiliary use. A policy which merely permits individual dentists to make more use of more highly-trained auxiliaries, however, is not likely to be sufficient to bring about the structural changes envisioned above. As noted, 'conscious parallelism' will probably be powerful enough to suppress competitive urges even if legal barriers are removed.

A second line of approach might involve licensure of independent auxiliaries. If periodontal care is the 'wave of the future' in adult dentistry, why not license dental hygienists to set up independent practices as periodontal specialists? Or one could license dental nurses to enter practice independently in the placement and repair of plastic restorations. This would follow the model of the public denturists. The expectation then would be that independent dental auxiliaries would use price differentials as a mechanism for securing patients away from dentists, and would bring down the general price structure for their services.

Problems with this system, apart from the general issue of assuring the quality of procedures performed, include the possibility that such new professions would tend to be as collusive as dentists. From the public perspective of dental health, however, the most severe problems would probably arise, as they appear to do with denturists, at the referral interface. Economic competition would lead to dentists trying to discourage patients from seeking care from independent auxiliaries, and as noted the professional's office is a very effective advertising medium. At the same time auxiliaries might be tempted to exceed their competence or to delay referral in order to avoid losing patients. As the denturist experience has made clear, 'team' concepts of dental care are virtually impossible to reconcile with independent competitive entrepreneurship. And unified entrepreneurship (the dental 'team' united as employees of the dentist) simply permits one 'team' member to collect all the profits and to regulate all the activities of the others. How severe this tendency toward fragmentation and compartmentalization of care might be is hard to assess.

An alternative which may be more promising than either of the above involves the backward (or forward?) integration of private dental insurance programs into the delivery of care process. This would be a special case of the more general strategy envisioned by Havighurst (1976) for a reanimation of market forces across the whole health services market. Already union-based dental insurance plans are looking at the high costs of conventional dentistry and the benefits available from setting up clinics with more use of auxiliaries and more careful procedural control. Nor is it necessary for such clinics to be under the administrative control of the insurance program; a growing trend in California is the development of 'chains' of dental practices owned by an individual or corporation which contract with companies or unions to provide all or a specified range of dental services for a group of employees at a fixed contract price. Clearly the contract and price can be set with some sophistication.

The incentive structure of such a clinic or clinic chain has obvious advantages over private practice, fee-for-service dentistry. The clinic owner or contractor has no incentive to over-use 'high-priced help,' quite the contrary. Dentists working in such a setting have no economic reason to resist expanded auxiliary use, if salaried they will be indifferent while if salaried plus profit-sharing they will have a positive incentive towards auxiliary use. Since the contract price is fixed, over-servicing is disadvantageous. On the other hand, genuinely effective preventive techniques are economically as well as professionally desirable for the contractor/clinic administrator as a means of reducing future workload (but not reimbursement). Moreover such a clinic setting is better adapted to researching effectiveness.

From the buyer's side, the employee group is simultaneously purchasing dental insurance and dental care, either through the insurer's own clinics or through a contractor. Failure to satisfy the patient group can lead to loss of the service or the insurance contract. Group buyers of this combined product have the capability to secure professional assistance for quality assurance. The contractor must be price-competitive and must satisfy patients, if he is to keep the contract. The 'product' being traded in the market-place is no longer specific dental procedures sold to individual patients; but dental coverage per time period sold to groups. Thus the buyer is more knowledgeable, the product is more standardized, and the definition of price is clearer – under such circumstances a competitive market is more likely to be an effective institution for allocating social resources.

It is beyond the ambitions and capability of this study to present either a detailed specification or an evaluation of a competitive system of integrated dental insurance and dental services delivery, based in large clinics. Analogy with the school-based children's service, however, suggests that such a development might be quite promising. Certainly it deserves further study and experimentation. Removal of professional barriers to such experimentation, in the form of restrictions on auxiliary use, is obviously a necessary step.

What cannot be overemphasized, however, is that public dental insurance on the private-practice, fee-for-service model will retard or inhibit the evolution of any new forms of dental delivery systems. By making it impossible for patients to benefit economically from the choice of more efficient practices, public dental insurance prevents such practices from growing by offering lower prices either for dental services themselves or for the associated insurance coverage. It therefore ensures that the main stimulus to efficiency is removed, and that any efficiency gains which might occur will not be translated into lower fees or insurance premiums. It might be thought that a really 'hard-nosed' public insurance program could force change by holding down fees to a level such that a practice could be profitable only with primary reliance on auxiliaries. The missing component in such a strategy is that the efficient, auxiliary-based practice must be *large*. Under universal public dental insurance, there is no stimulus to growth. The existing dental delivery system would be perpetuated, just as medicare has inhibited the use of nurse practitioners and other physician substitutes.

Given the problems of trying to enhance competition in dental care, one might be tempted to consider a public dental service. To our knowledge, no one has proposed 'socialization' of the whole dental care system, and the problems of such an approach have not been studied. The public dental clinic, with a very high auxiliary/dentist ratio, seems a natural adjunct to the community health centre and might constitute a selling point for that much debated institution. Tying public dental care to the CHC, however, clearly amounts to taking a very long view indeed.

Putting these various considerations together, it appears that while the potential economic benefits from increased efficiency and auxiliary use in adult dentistry may be very large, the evolution of the existing dental delivery system in its present form is unlikely to achieve them. The alternative public policies which might have a better chance of effecting these changes are not entirely clear; but it seems relatively certain that universal public dental insurance would amount to foregoing these benefits permanently. A reasonable strategy, then, might be to proceed with a public delivery system for children's dental care, where the problems have been reasonably well defined and studied, while exploring alternative competitive strategies for changing the structure of adult dental care. In this area, more research is clearly needed. It should be clear, however, that properly designed research can also be an important delaying tactic to prevent public interference with existing vested interests.

6

Under-use of auxiliaries in private practice: theoretical issues

INTRODUCTION

The technical efficiency with which resources are used in the owner-managed sub-sector of the health industry should not, according to textbook economic theory, constitute a social problem or an area requiring public intervention. The self-employed physician, dentist, pharmacist, optometrist, is the legal owner of the practice, and residual claimant to its net revenues. Consequently any objective function for such an economic agent which includes profit/net revenue/income as an argument would lead one to expect cost-minimizing or technically efficient behaviour in such organizations.[1] Monopoly power if it exists may lead to output prices diverging from marginal costs, and the direct influence which the professional exerts over demand for professional services may lead to excessive or unnecessary outputs; but the profit-maximizing owner-manager should at least be producing whatever it is that gets produced at the minimum cost.[2]

In spite of this theoretical presumption, however, there exists a widespread literature and a 'conventional wisdom' which asserts that the owner-managed health industry is characterized by systematic and quantitatively significant departures from technical efficiency, in particular with respect to input choice. Private practices over-utilize high-cost professional services, and under-utilize lower cost manpower substitutes. The pharmacist, trained for five years to count pills, pour medicines, and sell Kleenex; the dentist placing restorations in childrens' teeth; the physician providing immunization services and well-baby care; the optometrist dispensing eyeglasses (or the ophthalmologist spending three-quarters of his time doing refractions) – all are examples of overtraining, or use of unnecessarily high-cost inputs to carry out intermediate-skill functions. A significant part of the case for public intervention to reorganize the delivery system for health services involves the argument that public provision of services would permit a change in the balance of manpower use with lowered costs of health care and enhanced or at least equal levels of quality and patient satisfaction. In terms of production theory, it is argued that the owner-managed firm may be more likely to be on the isoquant for any given level of output than, say, a public delivery system, due to the differential cost-minimizing incentives that bear on the private firm. Nevertheless the owner-managed sector is so far up the side of isoquant in terms of over-use of high-cost inputs that it would be possible for a public system to lower over-all system costs by shifting its input mix even if its productivity for a given input mix were somewhat lower. This sort of tradeoff is worked out quantitatively in the report of the BC Children's Dental Health Research Project (1974).

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[1] Of course, other arguments in the objective function may change this expectation: more on that later.

[2] Insofar as certain inputs to the practice may be subsidized, as are hospital services provided free to the medical practitioner, the minimum *private* cost will involve over-use of such services relative to their *social* cost.

The literature documenting the technical feasibility for substitution of less for more costly types of health personnel is now enormous, and no useful purpose would be served by trying to enumerate it. Hadley (1974) provides a survey of health manpower literature from an economic perspective; Lippard and Purcell (1973) present a collection of papers exploring aspects of the use of 'intermediate level health practitioners'; and a US Health Resources Administration study on task delegation (Department of Health, Education, and Welfare 1973) provides quantitative estimates of the manpower substitution possibilities in a range of occupations including dentistry and pharmacy. The BC report provides a partial survey of the literature in dentistry, while the Commission on Pharmaceutical Services (1971) provides some information on the potential role of pharmacy assistants as 'counters and pourers.'

From an economic perspective, however, the interesting theoretical question arises from the conflict between the conventional owner-manager model which predicts cost minimization and the widespread empirical evidence suggesting the contrary. For planning purposes one could of course simply adopt the position that inefficiency in input substitution is documented, and proceed to survey the available evidence to determine a best estimate of its scope. If economic theory cannot explain such a finding, so much the worse for the theory. Nevertheless, a theoretical investigation of the problem may be justified on grounds other than idle curiosity or a compulsive urge to intellectual order. If one could develop some theoretical explanation of *why* owner-managers in the health care field are biased towards a high input cost technology, it might lend additional support for the empirical findings which, while widespread, are not without critics. Moreover, a better understanding of the incentive structures or objectives of owner-managers would permit one to make judgments as to the particular source of the distortion and so to suggest remedial policies. In particular, the fundamental issue (if one accepts that the existing private practice system *is* inherently biased towards use of high-cost inputs) is whether this can be corrected by structural change – e.g., permitting advertising of pharmaceuticals at the retail level in hopes that increased competition will increase efficiency and lower cost, or limiting the power of professional associations to regulate the input use decisions of their members by defining the roles of auxiliaries or restricting auxiliary/practitioner ratios. If the inefficiencies of the existing system are not amenable to such correctives, the alternative may be direct public provision with the management function of input mix selection performed by a public agency. The school dental service built around salaried dental nurses who provide the bulk of diagnosis and treatment represents this sort of more drastic policy alternative. Theoretical exploration of the possible sources of owner-manager inefficiency may cast light on the choice among general policy stances of enhanced competition, direct public provision, or perhaps even 'let ill enough alone.'

ALTERNATIVE MODELS OF INPUT MISALLOCATION

The evidence suggesting that owner-managed health care practices use high-cost input mixes seems to be predominantly of the 'value of marginal product' (VMP) type. It consists of identifying, either theoretically or in the field, the range of services which can be produced by an intermediate-level auxiliary, pricing those services out at an existing fee schedule or price level, and determining that the value of the marginal product of the auxiliary is greater than the corresponding wage.[3] This of course implies under-utilization if in fact the price level or fee schedule is independent of output level (i.e., infinitely elastic demand). Examples of this approach in the field are Romcke and Lewis (1973), Spitzer *et al.* (1974), and in a more involved way using a computer simulation model,

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[3] There exist, of course, numbers of studies identifying particular procedures or types of health services which could be produced by individuals less highly-trained than the current providers. The possibility of substitution is a necessary, but not a sufficient, condition for the identification of economic inefficiency.

Kilpatrick (1971). The work of Reinhardt (1972) in the US is in the same tradition; he fits a production function for physicians' services and calculates the marginal physical product for aides. He then assumes explicitly that input and output prices can be treated as parametric to the physician-manager, so that the difference between the value of the marginal product of aides and their wage cost is identified as under-utilization. Reinhardt also makes explicit the other half of the wrong-input-mix argument, by showing that the shadow price of physician time implicit in the production function – derived by equating the ratio of the marginal physical product of physicians to that of aides with the ratio of the physician time price to the aide wage – is much lower than the time price implicit in the fee schedule. He concludes (65): ... 'in choosing their aide-hour mix, the general practitioners in our sample implicitly treated their own time as a resource far cheaper than they thought it to be when setting their fees, and thus far below the price society was willing to pay for it.' Again, however, this comparison related the *marginal* value of the shadow price of physician time (from the production function) to the *average* price per physician-hour embodied in the fee schedule. The fee schedule price will be a marginal price as well, only if (as Reinhardt clearly recognizes) prices are parametric to each physician.

If prices are not parametric, and each physician faces a downward-sloping demand curve, then obviously the marginal revenue product of more aides as viewed by the physician will be lower than their VMP for the usual textbook reasons.[4] The average return per physician-hour will lie above its marginal value. The owner manager may well be equating the marginal revenue product of his/her own time to that of aide time and each in turn to the aide wage, at a level below both average gross receipts per hour, and the value of the marginal product of aides. In fact most of the information available on demand for medical services, insofar as that can be inferred from utilization statistics, suggests relatively low aggregate price elasticities – Newhouse and Phelps (1974) survey several recent studies – and this could only be made consistent with Reinhardt's assumption of parametric prices to individual physicians if there were perfect (price) competition in the physician services market. That assumption has limited appeal.

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[4] Actually a 'demand curve' in the usual sense for the product of a health service firm is not well defined as a result of the discretionary power of the supplier to influence quantity demanded independently of price. Thus the 'marginal revenue product' of aide or physician time will have to be defined in an extended sense, but this complexity can be deferred until later.

In the Canadian medical services market prices are of course parametric in the sense that physicians are reimbursed under fixed fee schedules, collectively negotiated. But since patients have full insurance coverage, the output of the firm is not dependent on its price. In this environment, the practice still does not face the infinitely elastic demand curve usually implied by parametric prices, and the formulation of equilibrium requires a more general model which will be developed below.

If the observed discrepancy between aide wages and aide value of marginal product (VMP) can be explained simply as the exercise of monopoly power, it still represents inefficiency in a social sense. Obviously aides are being under-utilized relative to society's valuation of their marginal product. But one cannot be sure that they are being under-utilized relative to physicians, dentists, or whoever the primary professional may be. Rather, the measured average returns to the owner-manager's time may be overstating his/her marginal valuation of it due to the inclusion of monopoly rents. In principle, one might address this problem by relating gross revenues to aide use across a sample of practices, as is done by Maurizi (1969) for the US; in this way one might hope to measure the marginal revenue product (MRP) of aides. But of course that would only be possible if each unit in the sample faced the same demand curve. Maurizi's results are of some interest, because they confirm the general finding of $\mathrm{VMP} > W$ for aides. His production functions are fitted in double-log form so that a coefficient on the aide input variable which is greater than the average aide wage share in gross revenues implies that VMP is above W for the average practice.[5] In the regression of gross revenues on aide input, the coefficient is 0.746 (p. 58) compared with a ratio of salary (and fringes) to gross revenue of 0.138 (p. 5) implying a VMP for aides approximately five times their average wage. This is of course distorted, since increasing aide input would involve increasing many other expense categories as well. But total expenses constitute only 45.6 per cent of gross income, and some of these are obviously attributable to the dentist's own activities, so the most liberal estimate of the impact of additional aides on fixed and variable expense would still leave the conclusion of $\mathrm{VMP} > W$ unchanged. Maurizi's production function specification is rather crude, and his data are not adjusted for variations in price or position of demand curve, because he was principally looking for scale effects rather than studying aide productivity *per se*. But the implication of his gross revenue equations is clearly that aides are under-utilized, and this is reinforced by his observation (p. 3) that *net* revenues per practice rise with aide input to levels of input well above average, implying that MRP lies above W. This finding is consistent with the results reported by the Canadian Dental Association survey of dental practice (1968) that net revenues rise steadily with scale of operation and rate of aide use per dentist. But one cannot necessarily conclude that the smaller-scale operations are inefficiently over-using professional input – they may merely face different demand curves.

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[5] Suppose gross revenues are price P times quantity Q, aide input is L and wages are W. Then in a double-log regression of PQ on L, the coefficient of L is $d \ln (PQ)/d \ln L$, or $(dPQ/dL)(L/PQ)$. Let that coefficient be k, then $d(PQ)/dL = kW(PQ/WL)$. But $d(PQ)/dL$ is the VMP of aides if P is constant, or the marginal revenue product MRP if P falls with output. So if $k > WL/PQ$, then $W < \mathrm{VMP}$ for P constant, and *a fortiori* if P varies, because $\mathrm{VMP} > \mathrm{MRP}$.

The difficulty which is created by this ambiguity arises when we try to interpret the observed VMP – W discrepancy. The health care literature identifying the profitability of aide use is not usually explicit, but appears to assume implicitly that inefficiency exists as a result of lack of information. The social inefficiency arising from under-use of aides is assumed to represent private inefficiency as well – failure by health care providers to adopt new technologies which would increase their outputs and net incomes. Thus the VMP of aides is assumed to correspond to their MRP – 'demand' for the services of each provider is treated as infinitely elastic. And the failure to adopt new and more productive technology is presumably due to ignorance or lack of information which more research and more journal articles can dispel.

The 'lack of information' assumption is a bit strained, since it requires first an explanation of why supposedly profit-oriented (if not profit-maximizing) providers have failed to discover these opportunities themselves. Moreover, it does not explain the steady opposition by organizations of health care providers to the introduction of new technologies. The reaction of organized dentistry in Canada and the US to the concept of the dental nurse, and the attempts by pharmaceutical organizations to place restrictions on the scale of operations and aide use of pharmacists, raises serious doubts about the adequacy of the 'lack of information' explanation. The contrast between the widespread acceptance of the certified dental assistant or equivalent as a worker complementary to the dentist, and the intense resistance to the dental nurse as a substitute for the dentist, suggests that other forces are at work.[6]

Reinhardt, on the other hand, suggests that the providers of health care may have preferences defined over the process of production of health care as well as over its outcome and the net revenues which it generates. If owner/managers dislike the tasks of administering a work force, and prefer instead to practice medicine/dentistry/pharmacy, then the over-use of high-level professional time may reflect these preferences. Reinhardt then points out that the ability to organize one's practice so as to indulge these preferences depends on an umbrella of excess demand – entry to the industry must be restricted in order to prevent competition from expanding supply and finally driving out the inefficient firms. In his interpretation the under-use of aides can be represented as taking out the monopoly rents partly in the form of technical inefficiency. This inefficiency is a social cost in addition to the allocative and distributional effects of limited entry.[7]

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[6] Terminology can be treacherous, as different people use the labels in different ways. A more detailed description of dental auxiliary nomenclature was given above in chapter five.

Such an explanation, which relies on the preferences of owner-managers for a certain type of technology, suggests that merely spreading information about the technical possibilities of manpower substitution will achieve little. If optimization with respect to a multi-argument preference function is already taking place, more research will simply tell practitioners more of what they already know. The policy alternatives would seem to be long-run; either to try to change the recruitment and education process which generates new practitioners so that preferences for small establishments and 'do it yourself' are less marked, or to increase the competitive pressure on practitioners so that only efficient producers survive. The point of the discussion of VMP measures of the feasibility of aide substitution, however, was to show that monopoly power by suppliers may not merely be an umbrella under which practitioners can choose to employ technically less efficient modes of production. It is possible that the existing evidence of VMP $>$ wage for aides reflects a perfectly normal downward-sloping demand curve situation. Owner-manager practitioners may be optimizing in a straightforward, net revenue sense, quite apart from any preferences defined on the technology itself. There are a variety of ways in which this could take place.

First, at the level of the individual practitioner-firm, several authors have noted that the owner-manager is also a labour supplier to the firm and that aides which substitute for that labour may lower the combined labour income plus profits of the proprietor while raising the profit component. Evans (1975b) makes this argument in a heuristic way in the dental field, Record and Greenlick (1975) suggest the same sort of explanation for resistance to nurse practitioners, and Evans (1976a) argues that one consequence of the current Canadian physician surplus will be to limit the development of the nurse practitioner if not eliminate her entirely. This argument suggests that the theory of the labour-managed firm may be of relevance in evaluating the incentives bearing on the individual practice. Does explicit recognition of the 'labour-managed' nature of the health care practice lead to a theoretical expectation of bias in the use of aide input, bias in the sense that aides will not be used up to the point where their marginal revenue product equals their wage? If so, this would provide a theoretical underpinning for the 'conventional wisdom' independent of monopoly power (since it would be derived from an objective function with an income argument only).

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[7] This argument may well be valid, but the 'umbrella of excess demand' requires yet additional arguments in the physician utility function. One must explain not only why physicians choose to under-utilize aides relative to their own time (preferences defined over technology) but also why they would not, for any given level of output, however produced, raise prices so as to mop up the existing excess demand. Given blocked or impeded entry, the existence of excess demand after (inefficient) choice of technology has been made implies that yet higher incomes are available. (Evans, 1972, 1976b).

Secondly, insofar as monopoly power in the form of a downward-sloping 'demand curve' may be an explanation for $\text{VMP} > W$, it is necessary to distinguish between such slopes at the individual and the collective level. Policy implications are rather different if we are dealing with a collection of local monopolists isolated by distance, perceived product differentiation, and barriers to information flow, or if the organization of all providers of a particular service faces (and recognizes) an elasticity of demand significantly less than that faced by each individual firm. A legally enforced collusive oligopoly model would suggest that restrictions on technology arise at the organizational level and are imposed on the individual firms; this differs from the labour-managed firm or individual monopolist model which suggests that constraints on aide use arise from the optimization process within the individual firm.

Finally, the above analyses are developed in a static, certainty world. It can be shown that in conditions of uncertain price or quantity offered in either input or output markets, optimizing behaviour at the level of the individual firm may differ from that predicted by the certainty models and may go some way toward explaining apparently inefficient patterns of input use. This explanation holds independently of peculiarities injected by the confounding of labour income and entrepreneurial profit in the hands of the same individual (or individuals) or monopoly power at the level of the individual firm, or constraints imposed by the provider organizations on the individual firm. Again, the policy implications differ in this case.

We will attempt to explore each of these models in turn, attempting to show whether or not they have the capacity to explain observed behaviour. If they do, we shall suggest what implications follow from each that might make one distinguishable from another, and shall sketch in some of the available evidence. The resulting policy implications tie in with suggestions for modification of current health care delivery systems.

THE HEALTH SERVICES PRACTICE AS A LABOUR-MANAGED FIRM

Meade (1972) pointed out that 'lawyers, accountants, doctors, etc.' tend to be organized as labour-managed firms, almost as an *obiter dictum* on the role of uncertainty in production and risk-spreading by labour (on which more later). This theme has not generally been developed, however, despite the very widespread use of this organizational form in the production of health services. The health services industry tends to be divided into firms which are either small and labour-managed, or large, professionally managed, but not-for-profit, with the pure profit-maximizing shareholder-owned firms restricted to the production of health goods such as drugs or equipment. The labour-managed model has been employed to interpret (or dissolve) the interface between these two forms of organization; Pauly and Redisch (1973) have characterized the hospital as a physicians' co-operative and have studied its optimum pricing and medical staff size decisions; while Rosett (1974) has considered the relation between the size of a hospital and the benefits to its medical staff of private ownership (by them) or 'public' not-for-profit status as alternative ways of extracting monopoly rent through profits or subsidized practice inputs. But the direct application of the labour-managed firm model to the private practice of a physician, or dentist, or pharmacist (or optometrist, or ...) does not appear to have been tested.

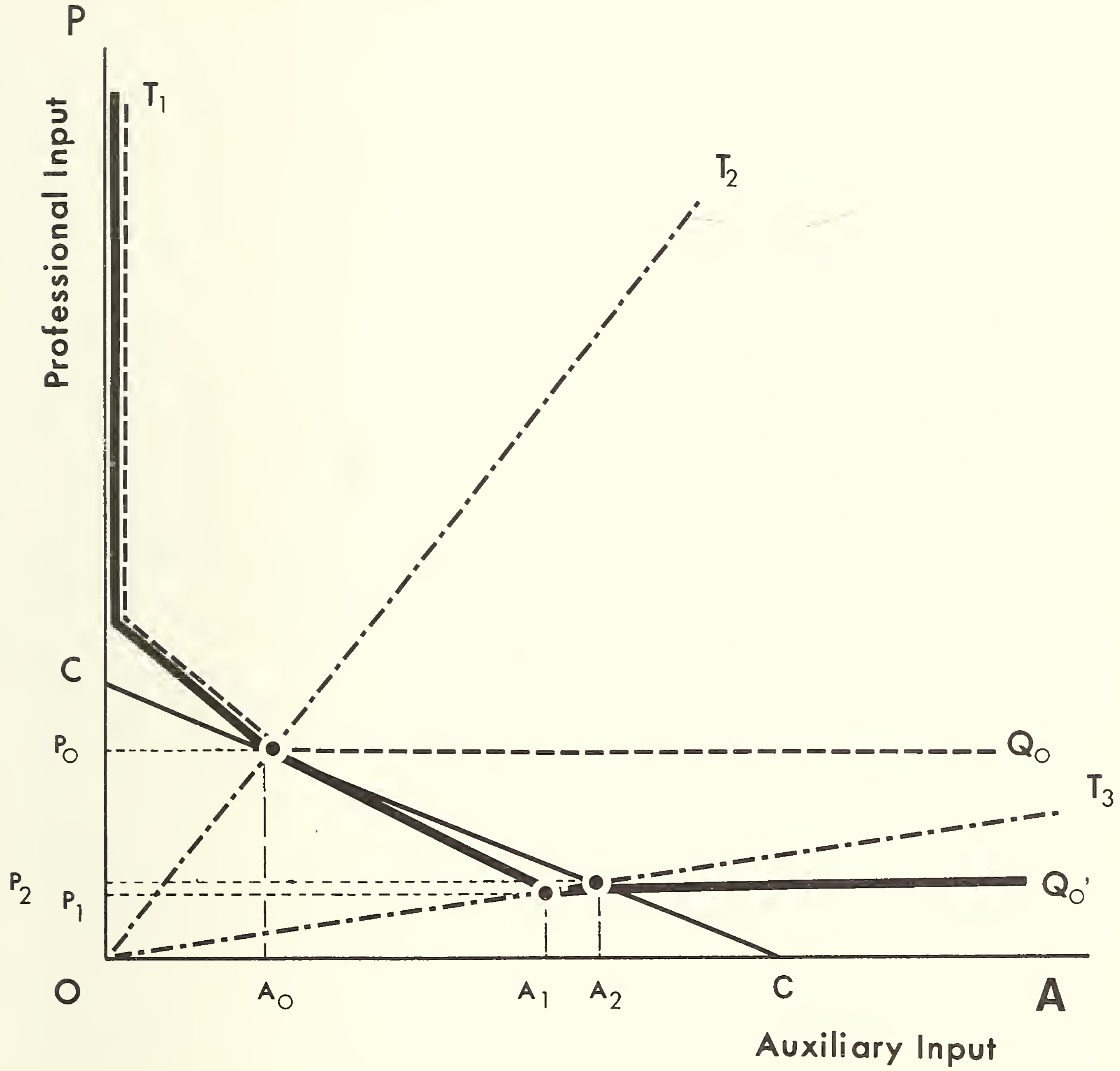
The purpose of such an exercise is as suggested above, to determine whether or not in such a context conventional economic objectives assigned to the owner-manager-worker give rise to restrictive behaviour at the firm level. In the absence of 'taste' variables (with their distressingly *ad hoc* flavour) can one show that the labour-managed health care firm will under-utilize auxiliary personnel? Again it must be stressed that in this context under-utilization means failure to add new employees whose market wage is less than their marginal revenue product. The finding of wage less than value of marginal product is a perfectly conventional monopoly power situation which raises only the question of whether such power is located at the individual firm level (downward-sloping firm demand curves) or whether it is exercised by collective constraints on individual firm behaviour (the cartel model).

At first glance, the labour-managed model shows considerable promise. First of all, it is descriptively accurate. The health care practitioner working in his own office or retail outlet may employ professional or non-professional assistants, but his/her own time constitutes a large proportion of the labour input of the practice. Moreover, the study of labour management has given rise to a number of predictions of restrictive behaviour at the firm level with consequent emphasis on the critical need for competitive conditions in output markets and easy entry of new firms if socially optimal output levels are to be maintained (Vanek, 1970; Meade, 1972, 1974). In general the problem arises because workers in labour-managed firms are assumed to seek to maximize average income per worker. If there are diminishing returns to labour in the short run, due to a fixed capital stock with a corresponding fixed debt charge, the labour-managed firm must make its employment and output decisions by balancing the losses in output and revenue per worker against the gains from spreading the fixed cost more broadly. As a result, the labour-managed firm will be more restrictive than the corresponding entrepreneurial firm, in the sense that if an entrepreneurial firm were converted to labour management, maximization of income per worker would require that output be not increased, and that it be reduced if any monopoly power exists (Meade, 1972). Moreover, an increase in demand will in the short run lead the labour-managed firm to *lower* its employment and output, recalling the finding of M. Feldstein (1970) of a backward-bending supply curve for physicians' services, by increasing the strength of the gains from raising average product per worker relative to the losses from spreading fixed cost over the smaller numbers of workers.

The restrictive behaviour of the optimizing labour-managed firm is thus very suggestive in approaching the problem of auxiliary use in health care firms. Intuitively it seems plausible that the professional worker-manager, as residual claimant to the firm's profits, must balance these against the earnings of his own labour. In choosing to substitute lower-cost auxiliary labour for his/her own high-priced time, the practitioner clearly raises practice 'profits' at the expense of self-employed 'labour earnings.' The two are of course commingled in the practitioner's net revenue, and it is not difficult to see that if the output of the practice cannot be expanded proportionately when auxiliaries are added, then the practitioner might work fewer hours and have less take-home pay as a result of choosing the optimum input combination.

The argument is most easily seen in terms of Figure 3, in which an activity analysis framework is used to reflect the fact that in dentistry and pharmacy output can be divided into a fairly small set of discrete functions which may be delegated or not depending on practice organization. Here the two inputs, professional time and auxiliary time, are employed to produce some unspecified composite output (restorations placed, prescriptions dispensed, etc.). Initially two technologies are available, T_1 in which no auxiliaries are used and the professional does everything, and T_2 in which a limited degree of delegation to auxiliaries (e.g., clerical functions) takes place. This two-technology world generates isoquant Q_0. Now a third technology involving more extensive delegation becomes available (e.g., dispensing assistants, dental nurses) which is represented by T_3 and generates the isoquant Q_0'. CC is drawn as the

Figure 3
Choice of output level, technology, and input mix in a practitioner-managed firm



isocost line corresponding to the initial equilibrium at technology T_2, with professional and auxiliary inputs P_0 and A_0 respectively.

It is easy to see that the new cost-minimizing point for output Q_0 on isoquant Q_0' corresponds to inputs of P_1 and A_1. The firm should move to technology T_3 and change its input mix, substituting auxiliary for professional time. It is equally easy, however, to see that this will result in a substantial cut in the professional manager's take-home pay, as total revenue will be unchanged (at Q_0 times whatever the unit price of the product may be) and outlays on auxiliaries increase. Profits increase because inputs P_1 and A_1 on isoquant Q_0' enable one to get below isocost line *CC*, but profits plus returns to professional labour fall. Nor would it help to hold cost outlays up to *CC*, by moving to input levels P_2 and A_2

(where CC intersects the T_3 technology ray). As can be seen, this still reflects a massive cut in P input relative to P_0 for a comparatively small gain in Q. Total P input could be held constant only if output were increased to the point where T_3 intersects the old Q_0 isoquant – a very large proportionate adjustment in output. Of course this would represent a significant increase in take-home pay – labour income constant with profits increased on higher output – *if* price remains constant. But of course for such increases in output it may not do so for the individual firm (and certainly will not do so for all firms collectively). Without introducing a description of the demand side one cannot say whether such an expansion will be profitable, but the possibility exists that none of the lower-cost points along T_3 will in fact yield as high a combination of labour income and profit as does the initial equilibrium T_2. In the absence of some external pressure, then, the individual firm may choose not to adopt the new technology; and in order to prevent external shocks may combine with other firms to restrict all firms' access to the new technology.

But this analysis is inadequate. In particular, it rests on an assumption of a given, exogenous 'wage' for professional labour input independent of the take-home pay of the worker-manager of the typical firm. In principle one could measure such wages, since there are salaried physicians, dentists, and pharmacists working in clinical practice as employees of other manager-practitioners. But their wages are quite clearly dependent on the average returns available in self-employed practice, which constitutes the principal alternative employment. Moreover such returns are indeed average, they do not reflect any marginal relation between net returns and labour input by the practitioner. Implicitly the argument has assumed that increased leisure corresponding to lower P input has no value.

This becomes immediately apparent if one writes down a conventional (continuous, twice differentiable) production function relating quantity of health services output to inputs of professional and auxiliary labour, as well as capital, etc. If the professional practitioner is assumed to maximize a utility function embodying leisure and income, it is obvious that the optimum input of his/her own effort will be where the marginal (after tax) revenue product of professional labour, multiplied by the marginal utility of income, equals the marginal utility of leisure. Moreover auxiliary input will be used to the point where its marginal revenue product equals its wage, or if input markets are non-competitive, its marginal outlay. There can never be gains from suppressing a technology at the individual firm level because at each level of inputs (and output) the marginal value of take-home pay is balanced against that of leisure.

Of course, a situation such as Figure 3 may *appear* to exist, in which a new technology appears more profitable at current *average* wages of professional and auxiliary input, but this is simply an illusion resulting from the monopoly rent component of the average wage. As discussed above, the marginal revenue product of professional time is lower than this average wage and an adjustment (steepening) of the isocost line to reflect the true relative costs of professional and auxiliary time to the firm would lead to an equilibrium on the T_2 ray. The T_3 ray appears more efficient from society's point of view, given the (rent-included) relative prices of inputs which society observes. From the practitioner's point of view, however, observing the true (rent-free) opportunity cost of the inputs, use of the new T_3 technology is not efficient.

This issue does not emerge from the literature on the labour-managed firm, because that literature focuses on enterprises with a large enough labour force that one can treat individual workers as discrete units and vary labour inputs by numbers of workers, rather than by varying hours of work. Thus the problem of balancing income and leisure preferences does not arise; each worker represents a constant quantum of labour and one may legitimately seek to maximize income per that quantum of input.[8] A corresponding assumption for the health services firm would be to posit an objective of maximizing income per hour of professional labour; but this would obviously be rather peculiar and implausible.

Moreover, even in the context of fixed coefficients of labour per labourer, the labour-managed firm literature concludes that non-participating inputs, such as capital or workers who do not share in the firm's decision-making or net revenues, will always be employed up to the conventional profit-maximizing point where their marginal cost is equal to marginal revenue product. An exception to this is Furubotn (1976) who explores conditions under which a labour-managed firm may under-utilize both capital and labour inputs. But his conditions boil down to an assumption that at any point in time, workers in such a firm have preferences defined over non-income variables, all such variables being negatively related to size of labour force (e.g., maintenance of decision-making control by the original group); and that capital formation from retained earnings will be inhibited as workers will be unable to withdraw these accumulations when they leave the firm and will not be able to maintain a claim against future profits. The latter problem can be surmounted by appropriate institutional arrangements – in the health services industry it is dealt with by sale of practices as well as a variety of grouping and income sharing arrangements – and the former is simply the familiar argument that if owner-managers have preferences for small scale and are willing to give up income to achieve this, then firms will be smaller. The labour-managed nature of the firm adds nothing

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8 An exception, however, is the literature on labour allocation decisions on the collective farm, e.g., Cameron (1973), which demonstrates the complexity of analysis in a firm with numbers of independent worker – decision-makers with independent income/leisure tradeoffs.

to this insight, except that those who actually supply labour to the firm may be more likely to have choices defined over its input mix as well as its net revenues. It would appear that labour-management *per se* will not explain under-utilization of auxiliaries.

These conclusions, however, derive from analysis of a smooth and continuous world. There are certain wrinkles which arise when one considers a relatively 'lumpy' world in which both practitioner and auxiliary input may not be smoothly adjustable, hour by hour. The practitioner cannot in general hire auxiliaries by the hour, though if segregation and scheduling of different patients is possible he may hire on a basis of days (or half days) per week. Thus dentistry probably permits less 'lumpy' auxiliary input than medicine or pharmacy, although in the latter case one can obviously hire part-time auxiliaries for predictable peak demands. Furthermore, the shifts in technology associated with changing auxiliary use can be approximated as discrete. There are specific delegation patterns associated with each level of auxiliary input per professional, so the corresponding isoquants will have the shapes of Figure 3.

Under these assumptions, the marginal cost curve takes on an interesting shape. For low levels of output, assuming that the practitioner's utility function has the marginal utilities of income and leisure positive and decreasing in the usual way, the marginal cost of own time used in the practice will be very low. The practitioner will tend to use technology T_1 from Figure 3, doing all his own work. As practice output rises, the marginal cost of output will rise too because of the rising marginal cost of own labour (leisure is decreasing, becoming more highly valued). The 'marginal cost' of output at zero output may be positive or negative, depending on the practitioner's attitude toward leisure when unemployed, but its slope as output rises is positive from the utility function assumptions.

The practitioner will continue to produce using only his/her own effort, until the marginal cost of own time rises to a point where it equals the cost of the combination of own time and auxiliary time (at a market wage) required to produce that output.[9] At that point (assuming for the moment that auxiliary

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[9] If T_1 is such that $P = a_1Q, A = 0$ and T_2 is such that $P = a_2Q, A = b_2Q$, where parameters $a_1 > a_2 > 0, b_2 > 0$; then this point will be where $a_1U_L = a_2U_L + wb_2U_Y$. Here $U = U(Y,L)$ is the practitioner's utility function, utility being a function of net income Y and leisure L, and $U_Y, U_L > 0$ are the corresponding partial derivatives. The average auxiliary wage is w. For Q below this point, L will be higher and U_L lower; correspondingly Y will be lower and U_Y higher. Indifference between hiring an auxiliary and 'doing-it-oneself' will occur where

$$U_L/U_Y = wb_2/(a_1 - a_2),$$

the right-hand side parameters being given by the technology and the market.

labour is completely divisible and non-lumpy) the practitioner will begin to employ auxiliaries and will use a mix of technologies T_1 and T_2. As output expands further, the mix will swing progressively toward T_2, but own-time input will not increase. Since auxiliary time is available at a constant wage, the marginal cost of output will remain constant until a complete transfer to T_2 has been achieved. A flat spot in the marginal cost curve will occur during the output range where both T_1 and T_2 are in use. When output reaches a point such that it cannot be increased further using T_2 except by raising own-time input, the marginal cost of output again starts to rise due to the need for the practitioner to increase inputs of both auxiliary time and own time. This increase in the marginal cost of output will continue until the marginal disutility of practitioner time reaches a level such that technologies T_2 and T_3 are equally costly.[10] The resulting marginal cost curve is displayed in Figure 4.

This marginal cost curve has several interesting features in addition to its 'flat spots.' First of all, it is specific to the firm because its location depends on the individual practitioner's income/leisure tradeoff. Second, it is specific to a particular state of the market or level of practitioner wealth. This is because the level of income in any period affects the marginal utility of income. If output can be increased and sold at a constant exogenous price, then an increase in that price will cause the income at any given output level to rise. Assuming the conventional signs on the second derivatives of the utility function, $U_{YY} < 0$, $U_{YL} > 0$, this implies that a rise in the exogenous price of output will cause the marginal cost curve to rise, and the flat segments to shift toward the vertical axis. Moreover, in the process of moving along the curve and increasing Q the net revenue of the practitioner rises, at least initially, so that in the process of moving across a flat segment output and net revenue will be rising and thus U_L/U_Y will also rise. This accelerates the process of substitution of the more for the less auxiliary-intensive technology, thus shortening the flat spot relative to its length if U_L and U_Y were not affected by the practitioner's net revenue. At the right-hand end of the flat segment, if practitioner income has increased,

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[10] In the terms of the previous footnote, this will be where

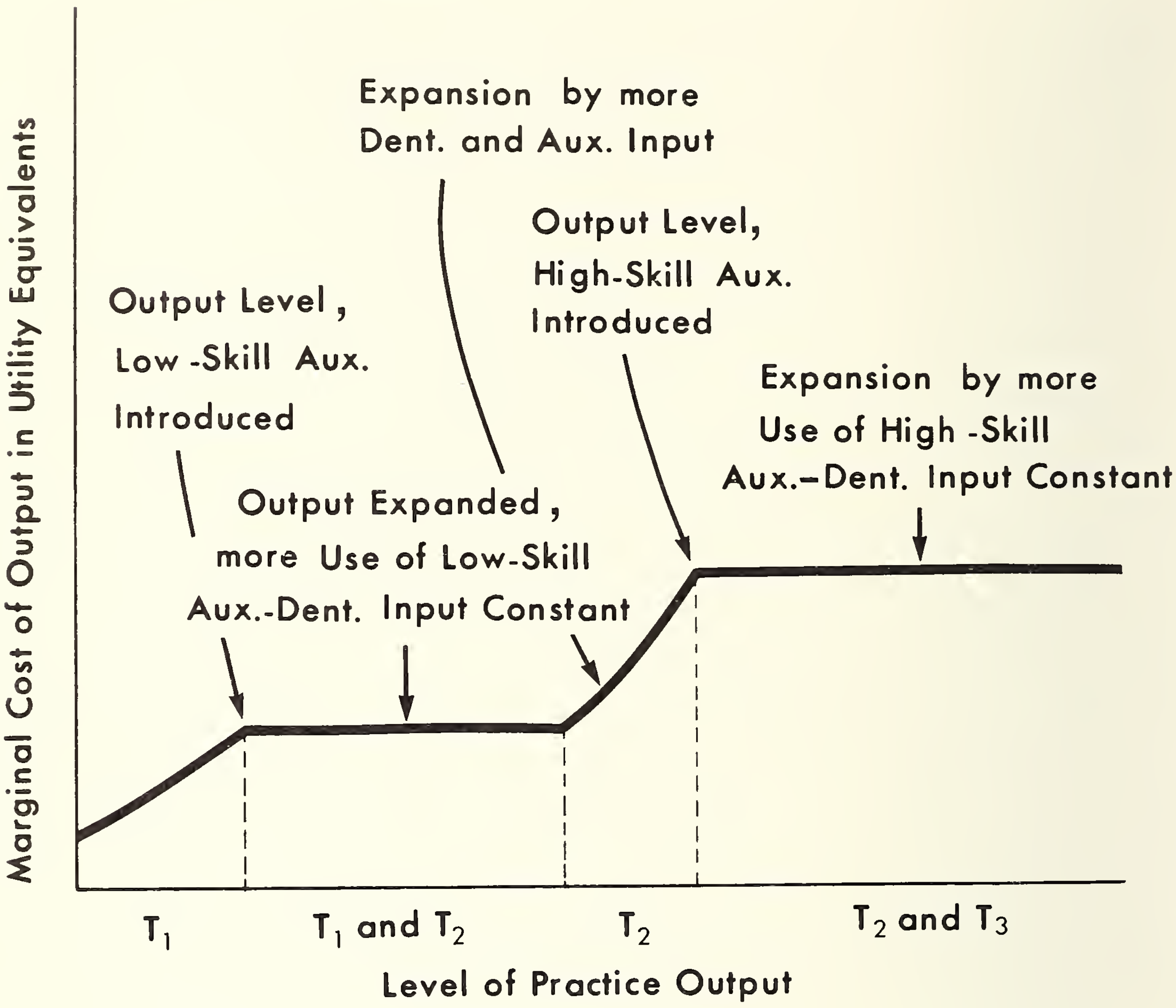
$$a_2U_L + wb_2U_Y = a_3U_L + wb_3U_Y.$$

As above, T_3 is a fixed-coefficients technology such that $P = a_3Q$, $A = b_3Q$ are the labour inputs of professional and auxiliary time required to produce a given output Q using T_3. The switchover point from all T_2 to a mix of T_2 and T_3 is at the point where

$$U_L/U_Y = w(b_3 - b_2)/(a_2 - a_3),$$

and since T_3 is a technology making more use of auxiliaries, $a_3 < a_2$ and $b_3 > b_2$.

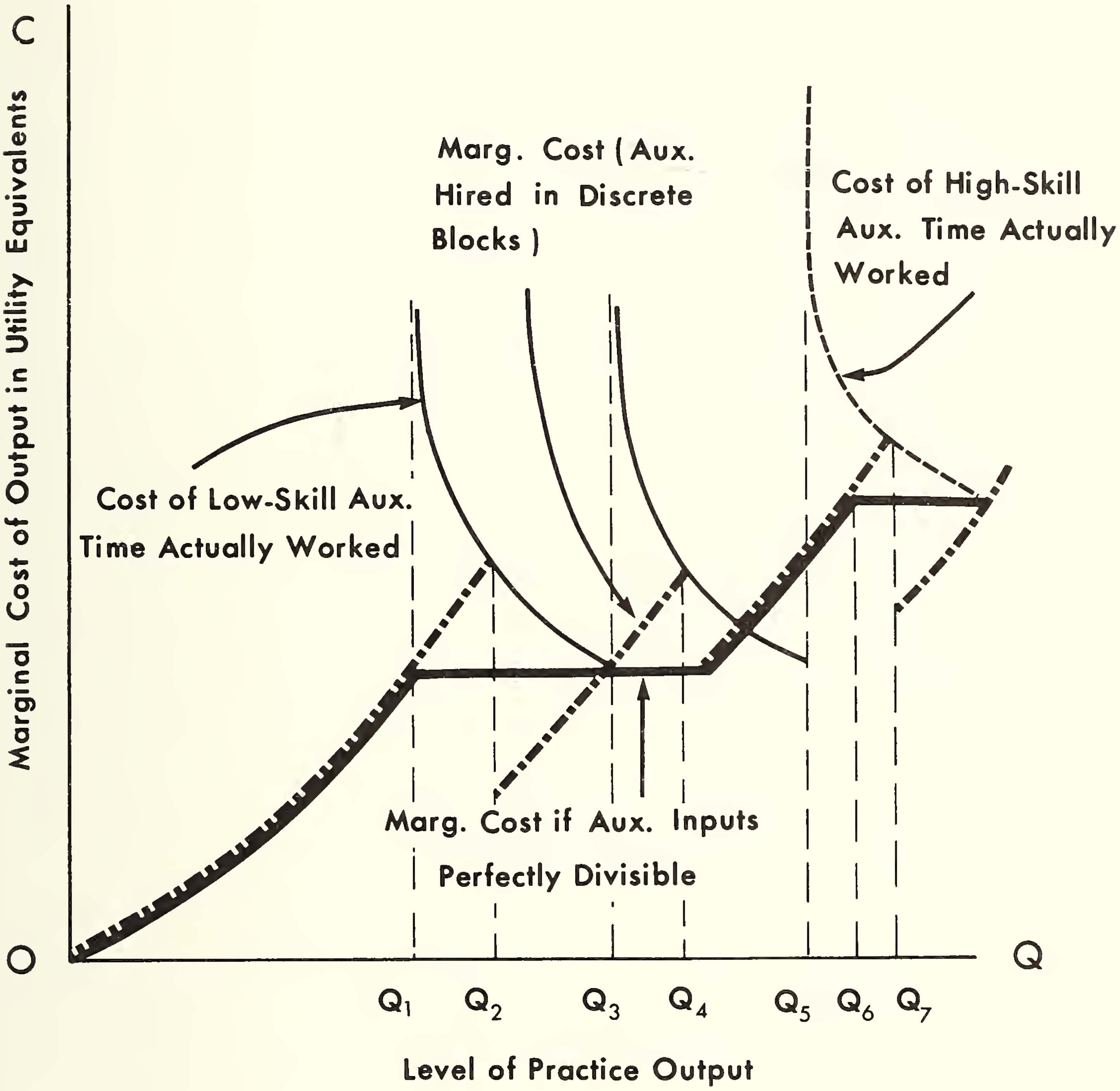
Figure 4
Rising marginal cost per unit of output as practice expands through increases in the practitioner's own time and/or auxiliary time



practitioner labour input will in fact have fallen but its marginal disutility will have stayed constant. And finally, if the individual firm has monopoly power so that output price falls with level of output, the marginal cost curve will rise less rapidly with output than if price were constant. This follows from the fact that net income to the practitioner does not rise proportionately withh output due to the necessary reduction in price.

The marginal cost curve with flat segments arises from the combination of production using own-time, with a finite set of specific (constant returns) production technologies. It does not allow either for preferences defined over the process of production, or indivisibility of auxiliary inputs. The former can be grafted on straightforwardly, however, by allowing the flat segments to have a positive slope dependent on the marginal (dis) utility of extra auxiliary input. Movement along a flat section involves holding own-labour input constant while

Figure 5
Rising marginal cost per unit of output as practice expands; practitioner's time continuously variable but auxiliary time purchased in discrete blocks



increasing input by adding auxiliary time and shifting the mix of technology used from T_n to T_{n+1}. If extra auxiliary time has a direct negative effect on utility, then clearly the marginal cost of output to the firm will be greater as more auxiliaries are used. The flat segments will be shifted up and to the right (as $U_A < 0$) and will tilt upwards (as $U_{AA} < 0$).

'Lumpy' auxiliary inputs, however, will change the flat segments more radically. Very small auxiliary inputs will require purchase of finite blocks of under-utilized auxiliary time, and the unit cost of time actually used will be correspondingly high. The result will be a curve as depicted in Figure 5. Practice output expands until level Q_1, with the professional practitioner working alone (technology T_1). At that point (given current auxiliary wages) the expanding practice would begin to hire a very small amount of auxiliary time. But if auxiliary time can be bought only in discrete units, if for example one can hire only one, or two, or three, full-time auxiliaries but not part-timers, then the effective wage rate per hour actually worked by the auxiliary is very high for output levels just above Q_1. The practice will therefore not hire an auxiliary at Q_1, but will expand using only practitioner time up to output level Q_2. At this point, the rising cost of own-time and falling effective auxiliary wage rate per hour actually worked – which has been falling as the expected auxiliary workload increases – reach a point such that the marginal cost of output is equal with either technology.

At Q_2, however, a discrete block of auxiliary time has been employed. Full employment of that time, along with a level of professional time input sufficient to equate the marginal cost of output with either technology given the market wage of auxiliary time and the utility cost of professional time, would generate practice output Q_3. Since the whole auxiliary time block has been paid for, however, it might as well be used. So at Q_2, the technology shifts from T_1 to as much T_2 as either auxiliary capacity or practice output will support. Professional time input therefore drops, and the auxiliary is fully employed. Further increases in output, however, will take place not by hiring another auxiliary but by increasing (now relatively less costly) professional time input. The marginal cost curve rises as output increases from Q_2 to Q_4, as over this range auxiliary input is fixed and professional input is rising. In the Q_3 to Q_4 range, professional input is once again above the level it would be if auxiliary time were continuously available; but a second block of time is not hired until Q_4.

At this point, however, the possibilities for substitution of low-skill auxiliaries for professional time (the shift from T_1 to T_2) are almost exhausted so that when the new block of time is purchased only part of it can be used at T_4 and professional input does not fall as far. Hence the marginal cost curve drops less at Q_4. From Q_4 to Q_5, professional input rises, and over the latter part of the range auxiliary input actually used does also. (There is some auxiliary idle input just above Q_4). At Q_5 the second auxiliary is fully employed and the next option is a high-skill auxiliary with greater substitution possibilities but higher wages. As before, such an auxiliary becomes worth hiring at Q_7, though if such auxiliary time could be purchased in divisible amounts hiring would occur at Q_6.

The result is as shown, a discontinuous marginal cost curve of overlapping rising segments. The range of outputs defining segment length bears no particular relation to the length of the flat step on the underlying continuous marginal cost curve, since the step length depends on the technology of dental service delivery and substitution possibilities while the number and length of segments depends on labour market conditions. If auxiliaries can be hired for a day or half-day per week, and patients can be scheduled to take advantage of this fact (Q not homogeneous but having greater or lesser substitution possibilities), then the discontinuous curve becomes a larger number of short segments, never departing very far from the continuous curve.

This curve structure creates the possibility, or even the probability, of multiple equilibria as a downward-sloping marginal revenue curve may cut more than one upward-sloping marginal cost segment as well as passing through a discontinuity. Each such equilibrium is a local maximum, which must be compared with each of the others to determine a global profit maximum position. In a full information, full certainty world, this complication raises no particular problems. But if the practitioner is subject to uncertainty, multiple local maxima imply that the practitioner cannot locate the global maximum by small exploratory adjustments; he must make discrete shifts in practice pattern which may be costly to take and even more so to reverse (if erroneous). Thus a combination of uncertainty/incomplete information available to the practitioner and indivisibilities in auxiliary use may inhibit such use, particularly if (as in the case of high-skill auxiliaries) more labour input requires more capital which cannot be used part time. This combination of problems, however, would have the same effect regardless of the structure of management of the practice, labour-managed or otherwise.

The marginal cost curve for the labour-managed health services firm thus becomes quite complex, when account is taken of the critical role of the practitioner's valuation of his/her own time relative to the cost of hiring auxiliaries. Moreover the curve itself will shift in response to changing output prices, as these affect practitioner income and own-time valuation, so the level and slope of the marginal cost curve will depend on the level and slope of the practitioner-firm's own demand curve. With the exception of the combined complications of indivisibility and uncertainty, however, the specification of this curve leaves unchanged the conclusion above that the firm will not be systematically biased against use of auxiliaries. At each level of output, the marginal cost of auxiliary time will be balanced against its marginal revenue product. Opportunities for increasing profit by adding auxiliary input will in fact be taken up; however a marginal revenue curve is specified (and appropriately adjusted for comparability in utility-equivalents) it will intersect the marginal cost curve from above, and at that optimum point the relative marginal costs of own-time and auxiliary time to the firm will be equal. Of course if the firm's demand curve is downward sloping the *average* return per unit of practitioner time will be greater than its marginal value, but that is the standard monopoly power result.

If auxiliary input is subject to indivisibilities, of course practitioner input may be extended beyond the 'optimal' Q_1 and Q_3 points and we may observe cases of health service firms in which auxiliaries are employed and yet the practitioner performs a certain number of auxiliary functions. But this could hardly be labelled inefficiency, since the cost of idle auxiliary time is a real economic cost to society as well as to the practice. If lumpiness in auxiliary time use is a technological given, then the use of a certain proportion of the 'inefficient' T_1 technology really does yield socially least cost output for some output ranges. It does, however, suggest that if such ranges are characteristic of a significant number of practices, there should be economies of scale available from the grouping of practitioners and the sharing of auxiliary time.

We conclude then that the labour-managed aspect of the health services firm does not in itself give rise to inefficient behaviour with respect to the use of auxiliaries. Labour-management does, however, have three relevant implications: (1) it obscures the actual marginal cost of practitioner labour to the firm, making difficult the comparison of the costs of professional and auxiliary time, (2) by involving the manager in the process of production it increases the likelihood that practitioner-managers will in fact have preferences over the mix of inputs used, and will express them in their input decisions, (3) it yields a rather peculiar marginal cost of output curve which will be of interest in the next section where we consider monopolistic behaviour at the firm level relative to collusive (and coercive) oligopolistic behaviour by associations of firms to restrict the use of certain technologies.[11]

CHOICE OF INPUT MIX IN A COLLUSIVE OLIGOPOLY

At the level of the individual health services firm, net income or income/leisure maximizing objectives do not appear to be reconcilable with under-utilization of auxiliaries. But the reconciliation is straight-forward at the industry level, as a method whereby a collusive oligopoly can effectively restrain output by all firms in order to hold up prices and incomes. It can be interpreted as the necessary second leg of a strategy of limiting the entry of new firms – in an industry with a large number of existing firms such limitation of entry is inadequate to maintain above-market returns. It must be matched by limitations on the output of existing firms. These may be either direct as in the case of agricultural marketing boards which limit the amount of output each firm can market, or indirect by limiting the form of technology each firm can use. If in fact the under-utilization of auxiliaries is the result of collective restraints imposed on individual firms, then the resulting problems of inefficiency may be correctible by changing the industry environment to remove these collective restraints; it may not be necessary to restructure the management of the firms themselves. The analysis of this question thus bears on the major policy issue of whether inefficiency in health services delivery systems is best corrected by greater emphasis on competition and market-type incentive mechanisms, or by more direct administrative controls or, in the limit, public takeover and management of the delivery system.

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[11] This is by no means a full discussion of the 'labour managed' aspect of health services firms; it has focused very narrowly on the issue of whether this characteristic could explain under-utilization of auxiliaries. Such a mode of organization may have very strong advantages in that it provides for direct monitoring of the production process by the entrepreneur and thus may maintain quality and minimize 'X-inefficiency.' There is a growing literature on such monitoring problems and their costs, e.g., recently Leibenstein (1975), Stiglitz (1975), McCain (1975), McManus (1975), and many associated references going back to Coase (1937). But it is generally focused on achieving technical efficiency for a given level of inputs rather than on systematic biases in input mix.

The strong economic incentive for some form of collective constraint emerges clearly from a differentiated oligopoly model in which each firm has a cost curve of the shape derived above. For reasons of location, practitioner personality, or whatever, each firm faces a downward-sloping demand curve for its own services, on the assumption that all other firms hold their prices constant (the *ceteris paribus* demand curve). If all firms move their prices together, however, the change in sales which any one firm experiences in response to a price change will of course be much less as the industry demand curve is typically less elastic than that faced by any individual firm acting independently. In the case of prescription drugs, it has been suggested that to a first approximation the aggregate demand for prescription dispensing has zero price elasticity – Walker (1971) uses this assumption. Of course, physicians may take account of drug costs and patient incomes in prescription writing; and the non-compliance phenomenon leaves open the possibility that patients may fail to have filled a higher proportion of prescriptions as prices rise, but these effects are likely to be comparatively small.[12] In any case the extreme zero elasticity assumption at the

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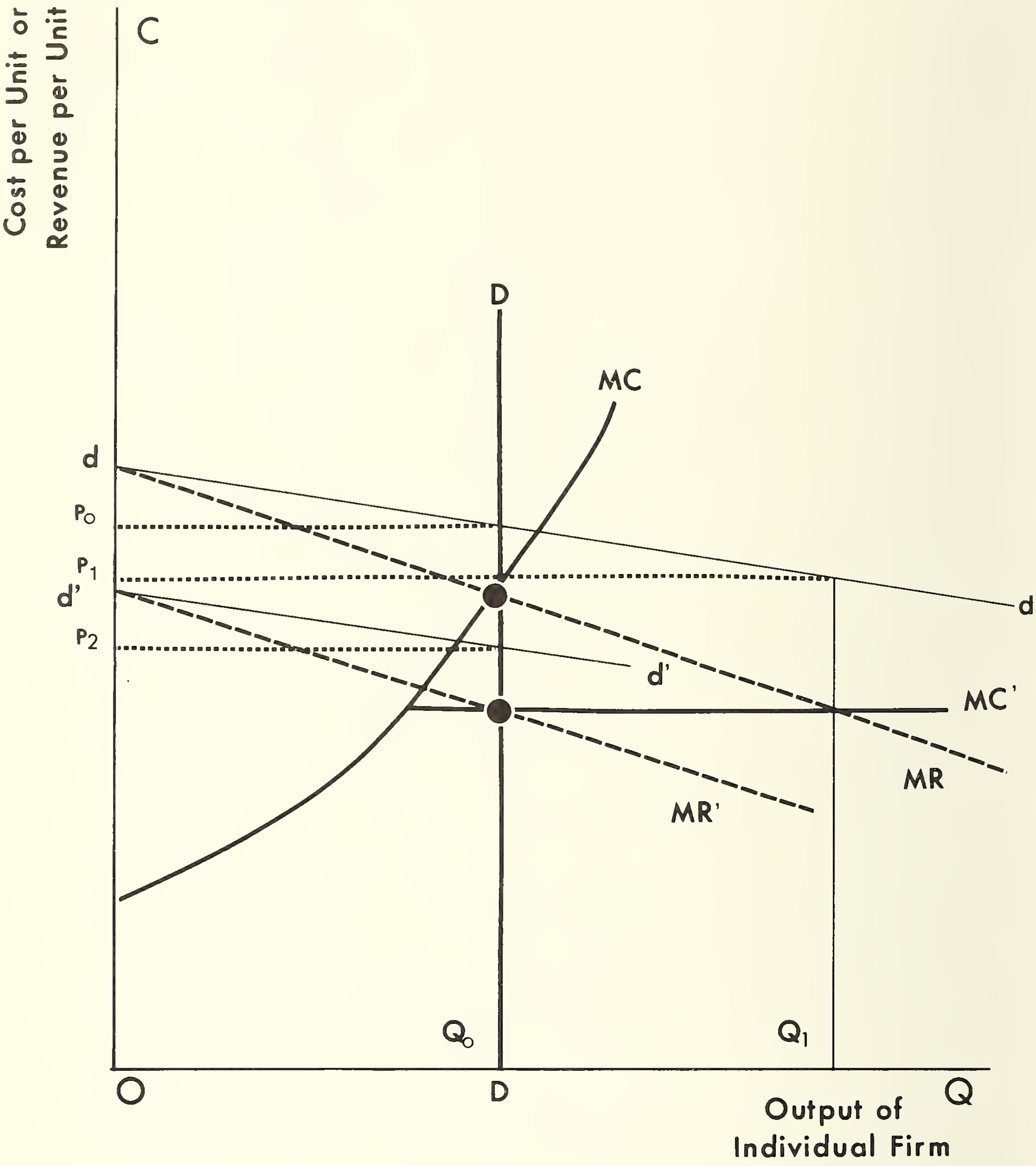
[12] Such an argument is in no way inconsistent with a finding that prescriptions per capita may rise when drug insurance is introduced. Previously non-prescribed OTC medications may become prescribed for reimbursement purposes, while if coverage is incomplete self-selection and transfer of drugs from insured to uninsured patients are obvious ways in which this can occur without raising total community use of drugs.

Figure 6
Price and output reactions of an individual firm to a cost-reducing technological advance in a monopolistically competitive industry



aggregate level makes the individual/collective problem clearer and easier to diagram as in Figure 6.[13]

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[13] All revenue curves are linearized for simplicity (the reader may if he wishes assume a log-scale graph). As Archibald (1964, 1965) has pointed out, if the demand curves are arbitrary, unambiguous qualitative conclusions become pretty scarce.

Figure 6 displays the marginal cost and marginal and average revenue curves for a representative health services firm. The marginal cost curves MC and MC$'$ are drawn before and after a technological innovation which permits a greater substitution of auxiliary for professional time, and introduces a new flat segment into the MC curve. (As drawn, this represents the first such use of auxiliary time in an otherwise purely professional input practice, and assumes no indivisibilities in such inputs. One could add flat segments to the left of Q_0, and discontinuities in MC$'$, but the diagram is messy enough already). This representative firm faces a *ceteris paribus* demand curve *dd* and corresponding marginal revenue curve MR, which represents the way the practitioner believes his sales would respond if he were to reduce prices. However the aggregate market demand curve is totally inelastic (the assumed pharmacy case) so that if all firms were to cut prices together, none would have any increase in sales. The individual firm's increase in output along *dd* is solely a result of increased market share at the expense of other firms.

The firm and industry are initially in equilibrium at a level of price and output for this firm of P_0 and Q_0, where the marginal cost curve cuts the *ceteris paribus* marginal revenue curve. The firm sees no gain from raising or cutting prices even if other firms hold theirs constant. Now an innovation in the use of auxiliaries is discovered, and the firm's cost curve shifts to MC$'$ with a flat segment. At this stage, MC$'$ cuts MR at a much higher output Q_1. The firm can raise its profits by hiring auxiliaries, expanding output, and cutting prices to P_1. If the firm's manager, the practitioner, is maximizing an income-leisure utility function, he/she will do just that, because opportunity costs of own-time are already built into the MC and MC$'$ curves.[14] Of course if practitioner preferences include distaste for use of auxiliaries, the MC$'$ segment will not be flat but will have a positive slope and the increase from Q_0 to Q_1 (and corresponding price cut) will be smaller.

But of course the new technology is available to everyone, and the auxiliary-using firm can be successful only if it expands its market share. If all firms act identically and simultaneously, then all firms will reduce their prices to P_1. (Or, if the differentiation of firms leads to an equilibrium price dispersion, all firms will move from P_0 to P_1 on their own sets of cost and revenue curves). No firm's sales will rise – prices go down to P_1 and output stays at Q_0. Viewing this situation, each individual firm will find that its individual *ceteris paribus* demand curve has now dropped, and passes through the aggregate *DD* at P_1, not P_0. Still, the corresponding MR curve will cut MC′ at a point of output greater than Q_0. (The intermediate sets of *dd* and MR curves are not graphed). If the firm myopically continues to assume no price response by its competitors, it will cut prices once more in search of the larger market share. This process will stop only when price falls to P_2, because at this point the final *d′d′* curve is such that its corresponding MR′ curve cuts MC′ at an output Q_0. At this point the output each firm wants to produce is consistent with the aggregate that the market will accept as shown by the vertical curve *DD* which is this firm's share of the price inelastic market demand.

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[14] As noted above, however, if this expansion were successful it would raise the income of the practitioner, thus raising the opportunity cost of leisure time, and moving MC$'$ upward and to the left. Q_1 would then overstate the new output. This will not happen because the expansion, for the average firm, will not be successful.

From the point of view of the firm, the technological innovation has been a disaster. Total revenue has fallen by the rectangle with side P_2P_0 and base OQ_0, because price is down and output is unchanged. Costs are down too, by the amount of the triangle between MC and MC′ cut off by *DD*. This is because, in the final situation, some auxiliary time will be substituted for practitioner time and practitioners will enjoy a bit more leisure. But even this is incomplete, because of course as practitioner incomes fall, the opportunity cost of their time also falls and the MC′ curve moves downward, shifting the flat segment to the right. This of course will induce a bit more adjustment downwards in price. It is not impossible, depending on the elasticities involved, that the MC′ curve could fall until its flat segment no longer intersected *DD*, practitioners responded to lower incomes by revising downward their own-time valuations until it was no longer profitable to hire auxiliaries at current wages and output levels per firm!

The disaster is of course short-run. If practitioners were earning a competitive return to their labour and human capital prior to the innovation, the resulting drop in incomes will encourage exit from the industry (early retirement, reduced recruitment, part-time work). For the representative firm remaining in the industry, *DD* will move to the right and the corresponding *dd* curve will move up and to the right. Output will rise, marginal costs are constant, and eventually exit will re-establish an equilibrium of fewer and larger firms, using more auxiliaries, and producing the same total volume of services at lower prices. Final long-run equilibrium prices will of course be higher than the short-run, post-adjustment prices which reflect the extreme excess capacity situation, but they will be lower than the initial prices P_0. The social benefit from improved technology is thus passed through into lower prices.

But from the practitioner's point of view this long-run equilibrium is small comfort. First of all, the process of exit from the industry, the transition phase, is likely to be unpleasant and costly to specific individuals who must suffer an abrupt write-down of the value of their human capital. But secondly, the pre-innovation rate of return to practitioners in the industry is not likely to be a competitive one. Earnings in the self-employed health professions tend to be above competitive rates, as reflected in the excess demand for access to those professions, and the limitations on entry to the professions which are imposed on quality grounds also have the effect of protecting the above-market earnings of such professionals.[15] Technical innovation in auxiliary use could, by expanding the output of existing firms, eliminate those excess earnings at a stroke.

Again, this is clearly to the benefit of society as a whole. If the services supplied by the 'human capital' embodied in a practitioner can now be supplied by a less-costly auxiliary, then the value of that capital has in fact fallen and its market return should reflect that fact. As for the monopoly earnings received by health practitioners as a spin-off from quality-based access restrictions, these represent pure transfers from society in general to relatively high-income groups. If they disappear in the process of moving to a more efficient mode of supply, that is probably an additional benefit.

The individual practitioner, however, can hardly be expected to see the benefits of the innovation from a broad social perspective. In this circumstance, optimizing behaviour by the individual practitioner yields benefits to society as a whole, but imposes costs on himself and on practitioners as a group. Nor can this problem be avoided unilaterally, because a decision to forego the new technology by one practitioner can be successful only if all act together. If one or a few adopt a strategy of cutting prices, hiring auxiliaries, and expanding market shares, the others will suffer reduced shares and will probably be the firms which in the end have to leave the industry. To be successful, the strategy of subverting the new more efficient technology must be collective and coercive.

Such a strategy would appear to have two major elements, both relying on the collective professional power over 'quality' standards. By defining auxiliary functions in some detail, either within practice acts or through by-laws or regulations issued by a professional association under those acts, a profession can forbid the use of certain technologies. Or it may set maximum ratios of auxiliaries per professional, or define certain procedures as beyond the capability of auxiliaries, or impose conditions of supervision which make certain patterns of use impractical. Moreover the concept of 'quality' and its definition in the health services field are so fuzzy that almost any regulation can be justified on quality grounds if a group of prominent practitioners declare it so. Since the regulatory process is internal to the profession, it is unnecessary to provide evidence that the regulations do in fact protect 'quality,' or to rebut evidence that auxiliary use does not dilute it.

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[15] It should be pointed out that the professions do not exert direct control, in the sense that the rate of recruitment to the professions is heavily dependent on the willingness of provincial governments to supply training places. This willingness, however, is reduced by the costliness of the training which in turn is a result of standards developed by the professions; moreover, the rather peculiar economic behaviour of health services markets makes it unwise to flood the market by training all who apply even if that were not enormously costly (see Evans, 1976a). The key observation is that qualified applicants to the professions exceed acceptances by a significant margin – that is *prima facie* evidence of excess earnings.

The second strand of the strategy involves the cross-elasticities of demand between different practitioner-firms. This is of course a key problem even in the absence of technological innovation. Going back to Figure 6, if the slope of the *dd* curve can be reduced, pivoting around the point P_0Q_0, the corresponding MR curve drops down and its intersections with MC and MC$'$ move left. This reduces significantly the benefits one can derive from the new technology. In the limit, if the cross-elasticities go to zero, *dd* becomes vertical too. There is no point in trying to use the new technology because market share cannot be expanded by price cuts. Moreover price becomes indeterminate, and subject to professional discretion, an ideal situation for generating or preserving monopoly returns.

Hence the need to define as 'unethical' such practices as price advertising which tend by generating more price information across firms to increase cross-elasticities of demand. In this context the shift to 'professional' billing by pharmacists of a flat charge per prescription over and above the drug ingredient cost and the shift to fee schedule billing patterns by physicians and dentists may be interpreted as methods for defining output units in a way such that uniform pricing behaviour across firms can be defined and observed. (The fee schedule phenomenon, of course, is also heavily influenced by the spread of insurance). The aim of the strategy would be first, to ensure that prices do in fact move uniformly so that practitioners are aware of their community of interest. This will make less likely the myopic behaviour of the optimizer in Figure 6 who consistently acts as if he could move along *dd* and change prices independently of everyone else, as well as reassuring the 'good' cartel member who wants to hold up price and avoid auxiliary use but fears that others will get ahead of him. Pricing should make 'conscious parallelism' (Moore, (1970)) more conscious. Secondly, while the interchange of pricing information among producers is promoted, 'ethical' restraints discourage its dissemination among consumers so that even if a practitioner decides to opt for the anti-cartel, market share expanding price policy, this information is difficult to communicate to consumers. Drug prices may not be advertised or even given over the telephone. The cost of dental services can be determined only by an examination visit to a practitioner – the X-rays and other diagnostic information are not transferable so each price quote is costly in time and money.[16] Fee schedules are not readily available to patients. Prescriptions may not (unless required by law) be labelled, making price comparison even more difficult.

Such behaviour is quite consistent with the collusive oligopoly model, and in fact there is evidence that collective regulation of competitive behaviour is successful in raising prices. Cady (1975) in a US study, concludes that regulations on prescription price advertising significantly increased prescription prices in those states with such regulations and were the major regulatory source of monopoly income gains to pharmacists. Benham (1972) and more recently Benham and Benham (1975) have found the same effect in eyeglass prices in the US; eyeglass prices in markets with more professional restrictions on advertising were 25 to 40 per cent higher than in less restricted markets. As a result significantly fewer individuals in restricted markets obtain eyeglasses during a year. A recent price survey done in the Department of Consumer and Corporate Affairs for the Director of Investigation and Research of the Canadian Restrictive Trade Practices Commission (1975) (with, unfortunately, a very small sample) found significant differences in eyeglass prices between Alberta and BC – the former prohibiting and the latter permitting advertising. Masson (1974) gets much more ambiguous results in examining the effects of mandatory prescription price-posting laws in the US; but it must be recalled that some pharmacy spokesmen have treated price-posting as desirable if it deflects pressure for full price advertising, because posting is in store only and need not be done in such a way as to attract attention. (See US, Federal Trade Commission, 1974, esp. 52-5).

This discussion of advertising is somewhat tangential to the main thrust of the discussion of this section, collective constraints on auxiliary use. It is relevant, however, in that if regulatory devices such as advertising prohibitions can reduce the elasticity of the *dd* curve in Figure 6, then they reduce the potential gains from introducing a new technology. Hence such policies reinforce the direct prohibition of the technology – not only can you not do it, but it will not be profitable if you do – and thus resistance to or violation of the direct prohibition is discouraged.

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[16] In principle, of course, a patient who has paid for radiographs might reasonably feel that he/she has title to the exposed films. One might imagine a world in which patients purchase radiographs and/or other diagnostic information and then compare price quotes for the indicated restorative services. In practice, however, practitioners tend to be very reluctant to give films to patients. Even if this barrier could be overcome, e.g., by a legal requirement that films be given to the patient on demand, other dentists need not accept the radiographs as adequate either in quality or coverage. A dentist might give a price quote over the telephone for a three-surface amalgam restoration, MOD (assuming the patient had learned enough to ask for one), and then discover on clinical examination that the radiographs on which this request was based were inadequate. His new radiographs reveal further decay. The patient could not tell whether he was receiving a higher standard of dentistry or of over-servicing.

Nor are regulations the only mechanism for achieving this result. The spread of private and public insurance reduces the price responsiveness of consumers, thus further steepening the *dd* curve. In the limit, under full insurance, market share will not be price responsive at all, and all competition will be either of non-price form or (in the case of pharmacy) competition via the non-prescription dimension of the business or the provision of ancillary services. Such services are themselves devices for limiting price sensitivity – the 'family prescription record' is presented to the public as a service to check drug interactions and allergies and improve 'quality of care.' As noted in chapter three, however, record systems are advertised *to pharmacists* as ways of discouraging price shopping and expanding sales.

The efforts to reduce cross-elasticity of demand in pharmacy at the individual firm and the collective level are suggestive that there may in fact be considerable potential elasticity in the individual *dd* curves if the regulatory power of the professional associations were limited and the price sensitivity of the consumer were not blunted by insurance.[17] The issue is a bit less clear in the dental field, however, and becomes particularly obscure in medical care in the presence of comprehensive first-dollar insurance coverage on the Canadian model.[18] The problem is that if prices are set externally and constant, the average and marginal revenue curves coincide and would appear to be a horizontal line. Since patients are not price-sensitive, the demand for any physician's services would be a vertical line. The two collapse to a single point – the physician must accept a

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[17] The Americans are always charmingly explicit about financial matters. A 1972 report to the American Pharmaceutical Association states, '... maintenance or acceptance of the present prescription price structure depends on the retention or restoration of the pharmacist's professionalism in the eyes of the public ...,' quoted in US, Federal Trade Commission (1974, 46). The report then comments that 'fulfillment of the identified goal ... required a full-scale effort to restrain by all possible means the one practice most closely associated with commercial activity ... the disclosure of price information to the general public' (47). Subsequent documentation of this full-scale effort is extensive.

[18] Insurance coverage may not be complete because of a degree of opting out or other forms of direct charge to patients; practice varies among provinces. This does not affect the argument significantly, however, as individual physicians in general do not have influence over the level of fees they charge.

regulated price and provide care to all who come to him. He or she may of course choose to turn patients away; thus his or her average revenue curve may be a horizontal line segment running out to the maximum number of patients who seek his or her services. But of course that is not the way the market works. Physicians, and also dentists, have a significant degree of influence over the level of utilization of their own services.[19] The average and marginal revenue curves are not exogenous, as they are for pharmacists (discounting direct pharmacy advertising), but depend on the particular advice given to the patient. Under these circumstances, the specification of average and marginal revenue curves becomes rather complex.

The principal difficulty is in establishing conditions for equilibrium of the individual firm. If the physician or dentist practice can in effect shift its own demand curve laterally as well as moving along it, the economic behaviour of such a firm would be analogous to a conventional firm with the capacity to advertise. in such a market, the firm is expected to invest in demand-shifting by advertising up to the point where the marginal cost of further advertising is just equal to the additional marginal net revenue to be derived from it. In the case of the physician or dentist practice, however, demand shifting takes the form not of advertising in the conventional sense to attract patients, but of advising patients once attracted as to the appropriate level of service consumption. The collective ban on advertising in the conventional manner of course makes good economic sense – insofar as such advertising serves primarily to reallocate market shares rather than to increase aggregate demand it would not increase revenue for the profession as a whole but would increase costs.

But the discretionary power over demand held by the individual physician or dentist for a given patient base is not reconcilable with an income or income-leisure maximizing utility function. It is straight-forward to show that *unexploited* discretionary power, or ability to induce demand shifts, is always sub-optimal because it is costless (monetarily) to use such power (unlike conventional advertising, which costs money) and because an outward shift in the demand curve faced by any firm unambiguously improves that firm's position in terms of income or leisure or both. The reconciliation as shown by Evans (1976b) appears to require the addition of a third 'ethical' term to the health practitioner's objective function which imposes a utility cost to the process of demand generation. Preferences defined over classes of patients as suggested by M. Feldstein (1970) are not sufficient to achieve equilibrium. If discretionary power over demand is always fully exploited, then it becomes irrelevant because discretionary shifts will not be observed. The demand curve faced by the physician becomes a binding constraint, and it will not be observed to shift endogenously in response to physician or dentist behaviour because it will always have been pushed as far as it will go. The widespread empirical finding of *positive* correlation between physician availability and price of services, among other things, suggests that unexploited discretionary power is a significant factor in the 'medical marketplace.' For dental care the empirical work is much less developed, but the same information structure surrounds the provider-patient relationship so a similar form of supplier discretion may be presumed to prevail.

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[19] Despite some resistance from more conventional economists, the concept of supplier-induced demand as a critical aspect of health care economics is now relatively widely accepted and increasingly showing up empirically. It is considered in a number of the articles in Perlman (1974), used in analysis of the physician service market by Evans (1972) and Fuchs and Kramer (1972), emerges from the empirical work of Rivard and Contandriopoulos (1976), Contandriopoulos and Lance (1976), and is integrated into a general discussion of health care economics by Fuchs (1974). Stoddart (1975) places the concept of supplier-induced demand in the context of models of the demand for medical care, and isolates some of its implication for empirical testing. So far attention has been focused almost entirely on medical care; but the same arguments carry through into dental services. Kushman and Sheffler (1975) have reported dentist pricing behaviour which is consistent with demand generation.

Once the 'ethical' term is added to the physician or dentist objective function, along with income and leisure, the average and marginal revenue curves in Figure 6 become subject to reinterpretation. A given practitioner seeking to increase the output of his/her firm can cut prices in the conventional way or can try to generate new utilization on an existing patient base by changing practice style and mix of services recommended.[20] Increasing output may generate falling average and marginal revenue, either in the direct sense of lower dollar receipts per unit or in the utility-adjusted sense that the ethical cost of increased utilization is a partial offset to the increased dollar revenues which each new unit of service brings in. Thus we can reconcile, for example, the observation of relatively low physician incomes and workloads in such over-doctored areas as the lower mainland of BC with high physician service price levels and per capita utilization rates in such areas, and the argument that physicians in such areas could certainly generate more utilization and income if subject to no ethical constraints.

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[20] The applicability of this line of argument varies for different health services firms. The physician practice, under Canadian payment arrangements, is the polar case of demand generation. Except for those physicians involved in some degree of extra-billing, expansion of output can occur only by way of demand generation with the corresponding utility cost of changing practice style or bending of 'ethics.' Dental practices have both options open, with the individual practitioner having some control over price (for both uninsured and privately insured patients) and practice style. The pharmacist has little or no capacity to generate demand for prescription drugs; attempts to increase market share are possible by advertising in the conventional manner for the non-prescription part of the pharmacy or supplying extra services such as delivery or patient records. Both such forms of advertising are, however, costly in the conventional, hard dollar sense. An ethical term in the pharmacist's objective function is not necessary to bring the firm into equilibrium (which is not to say it does not exist).

Parenthetically, it should perhaps be emphasized that the model thus described does *not* imply that practitioners habitually recommend and provide services which they know to be unnecessary or even harmful, stifling their consciences with dollars. Perhaps some do, but not many. One could equally well make the interpretation that the practitioner derives a positive sense of satisfaction from the social good his or her services generate, over and above the resulting income, but the process of urging such desirable and necessary services on a recalcitrant population is not particularly enjoyable. Inducing a downward slope in the utility-adjusted revenue curves for given price levels requires only that marketing of services is costly in a utility sense; the motives for such marketing may be lofty or base.

It might also be argued that since demand-generation by the practitioner is assumed to have a utility cost due to the third term in the assumed objective function, that effect should be reflected in the cost function. For purposes of reaching equilibrium, since both are functions of output level, it does not seem to matter whether revenues are adjusted downward or costs upward to reflect 'marketing costs.' But since the marginal cost curve already embodies the major role of the opportunity cost of the practitioner's leisure combined with the market costs of auxiliaries, keeping track of what is going on in this model would seem easier if the two direct utility effects of changes in output are kept separate and allowed to modify the positions of different sets of curves.

The recognition of practitioner discretion over demand has interesting implications for collective behaviour toward auxiliary use, because it influences the relationship between the individual firm demand curve and the aggregate faced by all firms. The critical characteristic of the market is that the demand curve faced by the individual practice should be more elastic than that faced by the profession as a whole. Insofar as individual practitioners can by varying prices affect the distribution of existing patients among practitioners as well as the volume of services each patient will use and the number of individuals in the population who seek care, the individual demand curve will still be more elastic than the aggregate and the collusive oligopoly argument holds. But efforts by individual practitioners to expand output by demand generation on an existing patient base do *not* affect market shares of firms defined across patients, and therefore do not create the same conflict of interest between the individual firm and the group of firms. A practitioner who shifts the demand for his own services by changing his practice style to increase utilization by a given group of patients brings about an equal increase in the demand for services at the aggregate market level.

The implications of this observation become clearer if we relax the assumption of a single dimension of output. Suppose instead we consider two types of output, one of which is subject to demand generation at relatively low ethical cost, and one of which is very difficult to expand. Dentistry gives a natural example; diagnostic and especially preventive services are provided with a high degree of discretion by the dentist. Preventive services are fashionable in spite of the very weak empirical evidence for their effectiveness (see BC, *Report of the Children's Dental Health Research Project*, 1974, especially chap. X) so that the 'marketing' cost is relatively low or even negative. The practitioner can derive positive utility benefits over and above his money earnings from encouraging prevention. Thus the individual and the aggregate utility adjusted revenue curves tend to be relatively flat. On the other hand, restorative services such as fillings are relatively difficult to expand in aggregate. There is a degree of discretion in when to replace an ageing filling, or to plug a cavity which is not yet carious – in general clinical rates of placement of restorations for a given sample group will tend to be above survey estimates of numbers of decayed teeth in that sample. But this discretion is limited – dental ethics would make it relatively 'costly' in utility terms for most dentists to make a practice of drilling out healthy teeth and filling them even if the manœuvre were never detected. Thus, to an approximation one can consider the aggregate demand for restorations to be relatively inelastic (roughly limited by the number of holes available); but the aggregate demand for preventive services is relatively elastic in the sense that each practitioner can by marketing efforts which are not very costly (if at all) to him in 'ethical' terms expand the demand for such services at a given price without lowering the demand of any other practitioner.

The argument of this section would then lead one to expect a very different collective response to new technologies, i.e., new types of auxiliaries, for producing preventive care compared with the response to restorative auxiliaries. A new flat segment in the marginal cost curve for production of preventive care, resulting from the employment of a dental hygienist to perform extended periodontal services, or the extension of the duties of a certified or otherwise trained dental assistant to include exposing and developing radiographs, applying topical fluorides, cleaning teeth above the gum line, or carrying out preventive education, all involve simultaneous increases in auxiliary time input *plus* increased supply of preventive services both at the individual practice level and at the aggregate level. All firms can engage in such marketing activities without bidding down the utility or dollar returns to each, because the market 'demand curve' for such services is no less elastic than the individual firm 'demand curve.'

The potential for expanding demand for restorative services, however, is much more limited since drilling new holes in existing patients is ethically costly, and cutting prices to draw in new patients to the market as a whole is financially costly. A new technology such as a dental nurse trained to prepare cavities (drill) and place restorations (fill) represents a drop in the individual firm's marginal cost curve for restorative services, which would encourage expansion of output of this service. Otherwise why hire the dental nurse? But since the market demand curve is less elastic than the individual firm, a 'tooth factory' built around high volumes of restorations per dentist and extensive use of auxiliaries could succeed only by taking market share away from other firms. Such an innovation would thus trigger the downward price spiral described above, with consequent benefits to consumers (lower prices) and society (more efficient production of dental care) but losses to providers (lowering of the monopoly rent component of dental incomes).

The economic model thus rationalizes empirical observation, that the use of auxiliaries in Canadian and US practice has grown steadily for a number of years and that their permitted activities have been extended as the preventive care services of dental practice have grown.[21] But the parallel introduction of restorative auxiliaries has been hotly resisted by organized dentistry, their success for fifty years in New Zealand has been denied, and in the US experimentation with their use has been politically suppressed.[22]

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[21] One might ask why a self-interested dentist would promote prevention if this in fact would lower the demand for restorative services. Several answers are possible. First, as emphasized, professional behaviour cannot be explained without using some combination of self-interest (income-leisure) and ethical objectives. Dentists *want* their patients to have healthy mouths. The universal support of organized or unorganized dentistry for water fluoridation is surely professionally motivated. At another level, however, as noted above the evidence that office-based preventive activity is actually *effective* in cutting the incidence of decay is, to say the least, mixed. Thus it is possible for dentists to expand their 'product line' in an ethically satisfying way, using a high proportion of auxiliary input and adding also to net income, and in fact not threatening their restorative workload. It is clear that regular and extensive preventive care reduces the number of restorations each patient needs, per visit. It is less clear that the total incidence of decay is reduced. Some have even suggested that water fluoridation merely defers the onset of edentulousness and so increases the 'tooth population' – once a patient has dentures he/she is lost to the dental market – and thus increases lifetime dental care spending, but to our knowledge this has never been demonstrated and is probably overly cynical.

[22] Successful experiments at the Forsyth Dental Clinic in Boston were halted by the state government at the urging of the state dental society in the late 1940s and again in 1974. Other such experimental programs have felt similar pressure, but much of the resistance is of course not of the sort which generates citable references.

The use of such restorative auxiliaries seems dependent on the development of a public service delivery program, as in Saskatchewan, Australia, or in the original case of New Zealand. The Canadian Yukon program seems to be the only example of a group of private practitioners actually adopting such auxiliaries (Pugh, 1969). This exception actually supports the economic rationale, however, as in the Yukon the 'firm' in question, a small group of dentists, *was* the industry! The problem of separate firm and industry marginal revenue curves did not arise.

Other alternative explanations of the acceptance of preventive auxiliaries and the resistance to restorative may be proposed. The standard industry response is couched in terms of quality and safety, that auxiliaries cannot in fact perform restorative functions to the same quality standards as a dentist. All available evidence refutes this. Taste variables are also suggested, that the 'mystique of the drill' and the dentist's sense of special skills and knowledge is severely undermined if an auxiliary can perform the same functions and that cleaning and painting teeth and demonstrating brushing are not bound up in the professional identity in the same way. The discussion above does not imply a position on these arguments. Rather it is intended to point out that a straightforward economic argument based on an income-leisure objective function for the practitioner with appropriate modifications to reflect the professional ethics aspect of demand generation (in the revenue curves) and the practitioner time component of labour input (in the cost curves) can yield exactly the same result. Thus modified, the oligopoly model using individual firm and aggregate market demand curves of differing slopes can explain not only a bias against more efficient auxiliary-using technologies, but also why the bias might be observed against one type of auxiliary but not another.

UNCERTAINTY AND INPUT USE IN THE HEALTH SERVICES FIRM

Taken together, the implication of the last two sections is that the problem of inefficient and overly costly mixes of labour input in health services firms is rooted not in the behaviour and objectives of the individual firm but in the conflict of interest between the individual firm and the collective. Suppression of technology, insofar as it is economically motivated rather than based on tastes in the general sense, arises from collective constraints placed on individual firms. These constraints are expressed through practice acts and the regulations thereunder, which create conditions for registry and licensure which are then instruments to coerce parallel oligopoly behaviour and maintain the cartel (see US, Federal Trade Commission, 1974, especially 45-109). Such an argument would suggest that improvement of resource use in health care production could come through changing this regulatory framework to promote, rather than suppress, competitive behaviour, which in turn would require transfer of regulatory powers from private provider organizations to public bodies acting in the public interest and presumably also limitation on the range of regulation.

If the collective constraints on more efficient use of auxiliaries could be eliminated, no economic barrier appears to exist at the individual firm level. 'Taste' variables may inhibit such use for a time, but providers with less strong aversions to auxiliary use will find themselves able to expand their market shares, so that over time the inefficiency problem will sort itself out. This of course depends critically on the more efficient producers being able to share some of their efficiency gains with consumers; universal first-dollar insurance would make this impossible and thus would perpetuate the existing inefficient technology. Moreover efficient producers must be able to communicate information about their lower costs; continued restrictions on price advertising would slow down the rationalization process by slowing the information transfer.

But this argument is incomplete, in that it has been carried through in an assumed environment of certainty for the individual firm. In such an environment, the firm must be constrained from choosing the most efficient technology by the collective. But once uncertainty of a variety of types is admitted at the individual firm level, greater use of auxiliaries may not, after all, represent the most efficient technology.

Uncertainty concerning the future economic environment for which the practitioner makes current input and output choices may be of several different types. Most obviously, the demand curve (whether exogenous or as suggested above endogenous and utility-adjusted) is a probabilistic concept. For the pharmacist, the stream of prescriptions coming through the door is a function of his price structure and the marketing effort of his front store; but it depends also on the state of morbidity in the population, the number and treatment styles of the local physicians (which in turn depends on the marketing efforts of the drug manufacturers) and the relative availability and competitive behaviour of other pharmacies. Similarly the dentist may have some degree of discretion over the level of utilization by a given patient once arrived, and may by 'practice management' affect the rate of recalls; but there still remains a residual element of uncertainty concerning the rate of arrival of new patients and falling away of old ones, as well as seasonal and possibly economic cyclical fluctuations in patients' willingness to have dental work performed. Dental care is generally perceived as postponable to a greater degree than medical care and the associated need for pharmaceutical services.

Such uncertainty in demand may or may not affect the firm's choice of input combinations, in particular the choice of fixed and variable inputs, if the firm is operating in imperfectly competitive markets. It has been shown by Leland (1972), Sandmo (1971), and Baron (1970) that the risk-averse firm operating in competitive markets under conditions of price uncertainty will choose to reduce the quantity of output placed on the market. This output, however, will be produced with the optimum input combinations. Inputs will also be used efficiently if the firm is a quantity-setting imperfect competitor – in both this and the perfectly competitive case the firm chooses its output level and then waits to learn the determination of the (uncertain) market-clearing price. The effect of price uncertainty will be, if the firm is risk averse, that use of all inputs will be reduced below the corresponding certainty levels, and output will be lower as a result. The level of output the firm produces is *not* uncertain, however, and the optimum input combination will be used. But if the firm is a price-setting imperfect competitor, fixing a price in advance of a given time period and allowing quantity to adjust to clear the market, then quantity to be sold in each time period cannot be known at the time the input combinations are chosen. Under these circumstances, Holthausen (1976) shows that if the firm is risk-averse it will use a capital/labour ratio below the most efficient level. Moreover the higher the degree of aversion to risk (for a given price) the lower will the firm's capital stock use become.

The application of these results to the health services firm is straightforward. It has been argued above that the dental practice or pharmacy faces a downward-sloping demand curve, hence is selling its services in an imperfectly competitive market. Characteristically such firms set prices for a period of time in the future and allow markets to clear by quantity adjustment. In specific cases, of course, the practitioner may adjust prices in response to a patient's request for a price quote by estimating in an *ad hoc* manner what price 'the traffic will bear' but this does not appear to be standard operating procedure. Thus the model of the imperfectly competitive price setting/quantity adjusting firm appears to apply.

Moreover risk-aversion follows from the fact that the net income of the practice represents the bulk of the net income of the practitioner. As Meade (1972) pointed out, one of the problems of the labour-managed firm as an economic entity is that its member workers have put all their economic eggs in one organizational basket. An investor can diversify his portfolio – the shareholders of any one firm are almost certainly shareholders in many others – so they can afford to be much more neutral toward risk. In fact 'speculative' shares may attract buyers who react *positively* toward risk and who want to own an asset with a possibility of spectacularly high returns even if they have to give up some average expected returns. But the appeal of such shares is as a *component* of a portfolio – not the whole portfolio. The worker, however, works for one firm only. Thus his earnings, in a labour-managed enterprise, are subject to the full variance of the net income of that enterprise. Under such circumstances a higher degree of risk-aversion in management should be displayed – 'don't gamble with the rent money.'

Finally the transfer from the behaviour of the capital/labour ratio to the practitioner labour/auxiliary labour ratio follows by recognition of the 'quasi-fixed' nature of auxiliary labour and the relation of each to capital stock. The quasi-fixed nature of employee labour needs no discussion; employees are hired for specific periods of time and embody fixed administrative costs of both acquisition and discharge. Health services firms do not employ labour in a shape-up or hiring hall format. Thus decisions on how much labour to use must be made in advance, and though 'lumpiness' may be mitigated by hiring auxiliaries part-time, e.g., several days or half-days per week, the contract cannot be instantaneously revised. Nor can the practitioner freely adjust his/her own labour input once auxiliaries are hired. If a fixed block of auxiliary time has been contracted for and demand does not materialize the optimum situation might be to cut back on own-time input. Supervision requirements, however, may make this unethical, if not unheard of. Moreover, the dental or pharmaceutical auxiliary requires capital to work with just as does the practitioner. At an early stage of substitution, e.g., T_1 in Figure 3 where auxiliary use is positive but minimal, the auxiliary may be performing clerical functions, passing instruments, cleaning up the operatory or dispensary. But once the auxiliary begins to perform clinical or dispensing functions, the practice will need additional dental chairs, or counter space, storage space, and inventory. These fixed capital expenditures go up at least proportionately, and perhaps more than proportionately, with auxiliary use. As a result, a risk-averse practitioner may prefer, in the face of fluctuating demand, to adjust his/her own labour input to meet such fluctuations rather than commit the practice to fixed expenditures which may raise expected practice net income but at cost of increasing its variance. The result may be, on average, over-utilization of practitioner time and under-utilization of auxiliary time.

This result emerges from uncertainty of demand conceived of as random fluctuation in the demand curve, which is the form in which the economic literature generally deals with uncertainty. The significance of this fluctuation in the health care field may be limited; in pointing to the problem of uncertainty in labour-managed firms Meade specifically mentioned small firms supplying professional services as being dominated by labour-management because their demand was relatively certain. The concepts of continuity of care, practice building and management, patient records in pharmacy, recall and prevention visits, and the general professional disapproval of patients who 'shop around' all express the institutionalization of attitudes or structures which dampen demand fluctuations for the individual firm. And while annual net earnings of a given health practitioner may fluctuate more than those of a salaried worker, they are obviously much more stable than, say, earnings per share of an average (if there be such a thing) corporation, or even a self-employed farmer or contractor. More important, however, in terms of auxiliary use, may be the uncertainty which is imposed by these very stabilizing devices on the possibility of practice expansion by use of auxiliaries. The increase in practice efficiency through use of auxiliaries depends critically on practice growth; but in the presence of all sorts of formal and informal collective restrictions on efforts to increase market share, the needed growth may be highly uncertain and the transition period during which it must be acquired may be seen as long and costly.

In this context one might re-evaluate the observation of the BC children's dental health research report (1974) that rates of auxiliary use and output per dentist were much higher in Prince George than in the Kootenays. This finding was observed to be associated with the relatively younger dentist population in Prince George, and was interpreted as reflecting 'tastes' and more flexible attitudes toward auxiliaries of younger dentists. Such an interpretation encourages the view that modifying dental training to include more use of auxiliaries would change use patterns. But it could also be that in a rapidly growing area (Prince George) the problems of practice growth and competing for market share do not arise. One can confidently expand the practice and move out along the cost curve in the knowledge that if the new patients are not here today, they will be next week, and will be drawn from in-migration not from other local practitioners. On the other hand the Kootenays are a region of relatively static population such that any attempt to expand a given practice by hiring more auxiliaries must be subject to considerable uncertainty about where the new patients will come from. Existence of long queues of patients unable to see a dentist would clearly mitigate this uncertainty, but a finding of prevalent dental disease would not, since need is not equivalent to effective demand.

Nor is demand uncertainty the only form. Uncertainty in input markets may limit willingness to use auxiliaries as it raises the possibility that fixed investments and the intangible costs of 'practice-building' may be undertaken in anticipation of shifting to an auxiliary-based technology but the auxiliaries may not be available. Particularly in smaller communities with thin labour markets, the risk that labour turnover may leave the practice 'auxiliaryless' can impose significant costs of carrying unused operatory and dispensing space, as well as of meeting the increased level of demand with an understaffed practice. Moreover this risk increases sharply with level of auxiliary use – if the practice is using on-the-job-trained auxiliaries then replacement may be quick and relatively cheap. But the wider the range of functions delegated by the practitioner, the more specialized the auxiliary, and the higher the probability that turnover may cause staffing problems. The obverse of this problem is a more short-run issue, the illness or other unavailability of the practitioner. The more auxiliaries in use, the higher the costs to the practitioner if the practice must shut down due to his/her absence since salaries of employees must still be paid. Insofar as the probability of periodic incapacity increases with age, this uncertainty provides economic justification apart from 'tastes' for the observation that older practitioners use fewer auxiliaries.

Thus the presence of uncertainty in both input and output markets can be shown to bias the choice of the risk-averse, practitioner-managed health services firm toward lower auxiliary/practitioner ratios in producing any given output level than would be justified as 'efficient' by their marginal labour earnings. This would be expected even in the absence of collective restrictions on auxiliary use. Such a bias is not inefficiency from the point of view of an individual firm, as the literature on input demand under uncertainty makes clear it represents optimizing behaviour. What is less clear is whether it is inefficient from a social perspective. The answer would appear to be, 'it depends.'

Suppose, for example, that the aggregate demand for prescriptions is not only price-inelastic but fixed (in *per capita* terms) from period to period. If it were randomly distributed among pharmacies, however, so that market shares fluctuated, the result would be that each individual firm faced a degree of uncertainty which was absent from the market as a whole. Each pharmacy might then choose, even in the absence of collective restraints imposed by pharmacy acts or by-laws, to under-utilize auxiliaries. These privately optimal decisions would be socially inefficient in aggregate because a larger economic entity, either a large private dispensary or a public one, would find its demand more stable and would thus be able to make more use of auxiliaries and lower costs. Such a more centralized dispensary, however, would impose additional travel costs on patients or would have to include delivery costs. It is conceivable that the reduced access costs to patients of the decentralized system would be such as to justify the extra costs of inefficient input combinations resulting from fluctuating demand; in this case the 'inefficient' input use would in fact be efficient in a more general context.

The problem is that under current forms of collective organization we cannot find out. If in fact society does not value access sufficiently to justify excessive professional time use, or if centralization plus delivery is more efficient than decentralization, a competitive market would reveal this information by the growth of large, lower-priced, auxiliary-using dispensaries, with or without delivery, at the expense of smaller decentralized ones with higher costs and prices. On the other hand if patients place a high value on low access costs and convenience, this would be reflected in continuation of the decentralized system. Present restrictions on auxiliary use and on competitive behaviour, however, make this competitive adjustment impossible and thus prevent society's preferences from being expressed.[23] The theoretical point is that whether or not the individual firms' decisions to 'under-utilize' auxiliaries due to uncertainty of demand constitutes inefficient under-utilization from a collective, social standpoint depends on patient preferences. The expression of these preferences, however, like the use of auxiliaries themselves, may be suppressed by collective constraints on supplier behaviour.

Uncertainty on the input market side also may differ between the individual firm and the aggregate market level, and may partly be mitigated by grouping. A group practice of dentists or pharmacists does not suffer from the supervision problem – the practice need not shut down if one professional is absent. Moreover labour turnover is less of a problem since the proportion of the auxiliary workforce affected will be smaller (although the incidence of turnover will of course be more frequent). But the possibility for grouping is limited by the extent of the market; it is obviously impossible in regions too small to support more than one practitioner. Similarly the extent of the market affects the size of the total auxiliary labour force available; in a large community the chance of a practitioner's finding that the only auxiliary in town has just moved (or will not work for him/her) is eliminated. Thus as a general proposition, the scope for increased auxiliary use in the absence of collective restrictions would appear to be greater in metropolitan areas and large communities generally – the market uncertainties which lead to 'inefficient' input use by practitioners in small communities may well be objective uncertainties such that the optimizing behaviour of the individual firm is socially optimal as well. It is possible that more efficient auxiliary use in this context would be achieved by a large organization, either a public dental service or a private dental corporation, which by its existence changed the labour market conditions of dental auxiliaries.

Also of importance, but hard to assess, is the dynamic phenomenon that the uncertainty costs of auxiliary use (due to input market uncertainty) are obviously much higher when only a few firms use auxiliaries of a given type than when most firms use them – in the former case the market is much thinner and possible turnover costs correspondingly higher. In this way institutional constraints and market constraints interact – any specific institutional constraint which discourages auxiliary use thins the market for such auxiliaries and raises the uncertainty costs of their use.

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[23] This is not, of course, the whole story. A more complete version is provided in chapter three.

CONCLUSION

The purpose of this chapter has been to investigate the theoretical underpinnings of the widespread view that private practice health service practitioners tend to under-utilize auxiliaries and over-utilize their own time, thus producing services at unnecessarily high costs. This leads many observers, including the authors of the present study, to argue that service costs could be lowered significantly if delivery systems could be modified to make more use of auxiliaries. From an economic point of view, however, this raises a serious question about why income-oriented practitioners do not spontaneously take advantage of the cost-reducing potential represented by auxiliaries. The answer may be found on at least four levels, which are not mutually exclusive, but which have different policy implications.

First, the finding may simply be wrong. If one uses the *average* income per time period as a measure of the *marginal* value of practitioner time, one may overstate that marginal value due to the presence of a monopoly rent component in health care practitioner incomes. Practitioners may not be under-using auxiliaries relative to the marginal value they themselves place on their own incomes. Similarly the finding that auxiliaries can generate output of a billed value greater than their wages may be irrelevant if the utility-adjusted 'demand curve' for output is downward-sloping. Monopolistic distortions at the individual firm level may be generating the apparent input inefficiency.

From a policy perspective, this line of argument connects with that of the earlier section on input mix in which a straightforward collusive oligopoly model is applied to the rather peculiar cost and revenue curves of the health services firm. This exercise shows clearly that *collectively* the members of a given health profession have a powerful incentive to limit the output of each, due to the greater elasticity of the individual firm utility-adjusted demand curves compared with that of the industry. Direct output restriction on the marketing board model would be difficult and potentially unpopular politically, so suppression of certain forms of auxiliary use on 'quality' grounds serves the same purpose. This line of argument suggests that a public policy of removing these restrictions might have a significant effect on improving efficiency of resource use in health care, but that to be effective such an anti-combines approach would need to include removal of restrictions on competition over market share as well. Of course a general policy of promoting price and other forms of competition would have other effects as well, as discussed in chapters two to five above, and its applicability will vary across different types of health care. Its reconciliation with health care insurance can be difficult.

The third line of analysis focused on the extent to which individual optimizing health care firms might under-utilize auxiliaries, even in the absence of collective restriction. Insofar as this might be true, the pro-competitive policy of removing collective restrictions would fail because individual firms are not in fact being constrained. Two theoretical branches were examined, the labour-managed firm (the second section) and the input decisions of the firm under uncertainty in output and input markets (the fourth section). It appeared that the labour-managed aspect of the health services firm does not lead to any bias against auxiliary use, although it does lead to rather unusual cost functions which have implications for collusive oligopoly behaviour (third section) and uncertainty behaviour (fourth section) because of the significant role of practitioner-time and its marginal opportunity cost in the firm's cost structure. Uncertainty, however, may bias the optimizing practice against auxiliary use – this may or may not be socially inefficient depending on the specific circumstances of patient preferences and supplier availability. In general the collective restrictions imposed by practitioners on individual behaviour make it difficult to determine if privately optimal decisions are socially sub-optimal.

Finally, under-use of auxiliaries may arise due to pure 'taste' variables – practitioners may simply choose not to delegate because they have preferences defined over style of practice as well as net income and personal work effort. This is a diagnosis of exclusion – if no economic rationale can be found for under-use of auxiliaries it may be 'explained' in this way. The 'explanation' is not very helpful, but may be correct in spite of that. If true, it points toward changing the educational experience of practitioners, original and continuing, to promote a more positive attitude toward auxiliary-based technologies. There is undoubted truth in this latter approach – nothing undercuts more effectively a staunch practitioner position that 'auxiliaries cannot do X' than the actual observation, and study of the results. This probably underlies the opposition in the US even to experimentation with dental nurses to 'drill and fill' on the New Zealand model. But the 'tastes' policy conclusions are opposed to the 'collusive oligopoly' conclusions – if collective restraint to maintain prices is the explanation for under-use no amount of education will help. On the other hand a more competitive environment could make certain kinds of 'tastes' substantially more expensive.

Unfortunately that is not all that more price competition might do, particularly if demand can be generated by practitioners and if price competition is incompatible with insurance. The potential for social benefits from more price competition is very different from one health service to another, as between, e.g., prescription dispensing and cardiac surgery. For services where price competition does not seem to be possible, and taste modification through education of practitioners is inconsistent with economic motivation at the individual firm or collective level, the only alternative which can improve auxiliary use may be modification or abandonment of private practice. This may well be the case with medical care, as the community health centre advocates suggest. But the case in dentistry and particularly in pharmacy may be different, as discussed above.

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Summary and conclusions

To any reader who has persevered through the previous six chapters, it will now be very apparent that the conclusions derived from this study rest on an extensive structure of observations and assumptions, quantitative and behavioural. Some parts of this structure we regard as quite solid, others are of necessity highly speculative. A synthesizing study such as this one must accept and combine information from many sources, knowing that the improvement of each such piece of information would represent a challenging research project in its own right. An obvious example would be the current pattern of distribution in Ontario of dental or pharmaceutical expenditures by income class, preferably adjusted to include non-monetary income and to exclude transitory components; we have used very scattered or impressionistic information to substitute for non-existent hard data on this issue. An equally important problem, the quantitative response of dental or pharmaceutical utilization to insurance, has already withstood a number of research challenges. Several studies provide the answer, but their answers are all very different. Yet no estimate of the costs of any health care program can be made without 'an answer' to the question of utilization response.

What we have tried to do is to lay out a general framework within which the costing and evaluation of alternative public programs for pharmaceutical and dental care might be carried out. It is not a complete framework in that it does not specify particular programs in the sort of detail an administrator would require to establish a budget. The latter degree of completeness, however, could be bought only at the significant cost of narrowing down one's field of focus to a particular type of program. Rather we have identified and linked together numerous issues which seem to be important in choosing among different sorts of programs, and the judgments, quantitative and otherwise, which must underly both the making of such choices and the costing out of the consequences. A reader may disagree with some of our specific quantitative estimates, or time may provide better answers; and the procedures in the chapters above will then permit such a reader to determine the impact which alternative estimates would have on our conclusions. But we believe that the evaluation of any program of the types we have outlined above requires *some* answer to each of the questions we have raised; too often these issues have been glossed over and thereby answered implicitly. Implicit answers to complex questions tend to be inconsistent if not downright silly.

Subject to these general *caveats*, then, we summarize in Tables 5 and 6 our estimates of the total cost of universal pharmaceutical and dental insurance in Ontario in 1975. We have used 1975 dollar costs and population in order to base our results on concrete data which are both recent enough to be interesting and yet old enough to be available (or in some cases, not too far removed from available data!).[1] We conclude that if there were no utilization response at all to the introduction of universal insurance, total costs for a public, first-dollar, 100 per cent, pharmacare program would be $254.9 million and for a similar denticare program, $249.2 million.

The rather surprising lower cost for denticare, however, is a result of the extremely low current rates of utilization of dental care among adults, and would be very sensitive to shifts in utilization patterns. By contrast, we estimate that a denticare program which succeeded in bringing dental care for the whole population up to a standard considered 'optimal' by dentists as reflected in the care given to patients receiving regular treatment in affluent communities, would cost $641.4 million or two and a half times as much. We have no similar basis on which to judge 'optimal' use of pharmaceuticals, though there is growing concern that an optimal program would involve less use of drugs rather than more (with perhaps more use of pharmacists' services in the pre-prescribing phase).

The evidence seems quite conclusive, however, that dental insurance *per se* does not have a major impact on dental care utilization rates; its impact is

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[1] For example, the estimated average cost per prescription in Ontario in 1975 combines data from several sources which are mostly 1974 or older. Since the estimate of $5.07 was made, the Green Shield 1975 annual report of Prescription Services Incorporated has been released, covering over 150,000 people and over one million prescriptions in Ontario, which reports average cost per prescritpion of $4.99. We appear to be in the ballpark.

TABLE 5

Estimated expenditures for a universal public pharmaceutical insurance program (Ontario 1975)

Total population, 1975	8,237,000
Estimated prescriptions per year per person – no response to insurance	5.87
Estimated average price per prescription	$5.07
Total cost of a universal public pharmaceutical insurance program, 1975, assuming no utilization response and 20¢ per prescription administrative costs	$254.9 million
Estimated utilization response to insurance	10-25 per cent
Total cost of universal program, with 20¢ per prescription administrative costs and with utilization response	$280.4-318.6 million

SOURCE: chapter two

TABLE 6

Estimated expenditures for a universal public dental insurance program (Ontario 1975)

Estimated population, 1975	8,237,000
Estimated expenditure per year per person, no response to insurance	$28.81
Total program cost, including 5 per cent administration expense	$249.2 million
Estimated annual cost per person 'optimal' care	$74.16
Total annual cost of universal 'optimal' dental care	$641.4 million
Estimated probable level of utilization of 'optimal' care after insurance	60-70 per cent*
Total cost of universal dental insurance, 1975, assuming probable utilization	$392.7-458.1 million*

SOURCE: chapter four

* assuming adequate availability of dental services

primarily on the amount of care received by regular users prior to insurance. There may be some initial effects as the newly insured seek to reduce their backlog of uncompleted care, but the longer-run or maintenance care effects appear to be far short of universal optimal care levels. Our estimates of 1975 costs do not take account of any such backlog effects as might have occurred if an actual denticare plan had been introduced on 1 January 1975; rather we have tried to measure costs of a long-run or maintenance program using 1975 population and prices.[2] Allowing for what we feel to be 'most probable' ranges of utilization response, we derive estimates of total program costs in 1975 for pharmacare of $280.4-318.6 million and for denticare of $392.7-458.1 million.

Again these should be qualified; they represent estimates including the amount by which utilization and costs would rise in response to insurance *if* there were no supply-side constraints. We judge that the severe surplus of dispensing capacity in pharmacy could easily absorb larger workloads with a rearrangement of pharmacists' time away from retailing. In fact, we later estimate that a rationalized dispensing system using full-time dispensing pharmacists and pharmaceutical aides could triple dispensing volume on the present base. Supply constraints are likely to be much more important in dentistry, however, at least in the short run, and program costs for an actual program begun in 1975 would probably not reach the levels here estimated until dental service capacity could be raised correspondingly. The result would be a variety of forms of non-price rationing, probably favouring those currently under care, and a much larger group of dissatisfied would-be patients who might quite reasonably ask why they were paying taxes for unattainable care. Even after dental services supply were expanded to meet demand, however, current experience suggests that utilization for the population as a whole would at best reach the 60-70 per cent range.

Moreover supply-side responses go beyond expansions of capacity. We have assumed that a public program could be introduced without triggering any upward pressure on prices of dental services or patterns of care judged 'optimal.' Both of these assumptions are made primarily because the alternatives are difficult to quantify. But a universal public program is likely to result in short-run upward adjustments of average fees billed to equal listed fees in both dental care and pharmaceutical dispensing, as well as long-run pressure on listed fees which will be expressed through negotiation with the provincial government. Also, particularly in dental care, there are numerous services whose frequency or even performance is highly discretionary and there is evidence that insurance encourages over-servicing. Specific frequency limitations or exclusions are necessary to restrain this upward creep in costs. We have not attempted to estimate its resultant magnitude; but it is doubtful if administrative controls could be perfect.

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[2] We have also used an estimate of 1975 'optimal care' uitlization pattern data, which in fact relates to the mid and late 1960s. Insofar as the definition of optimal dental care has been expanded to include a wider range of preventive services, the $641.4 million could be a significant underestimate.

Given these program costs, what do denticare and pharmacare buy? The obvious answer, dental care and drugs, is equally obviously wrong. These services (or goods) are being bought now, through a relatively imperfect market indeed but one which 'works' in some sense. The question is rather, what benefits are to be sought by imposing a public insurance program on the existing framework? And the conclusion from the above chapters is that in general the benefits of a universal public program for either pharmacare or denticare are not great, and are probably outweighed by the costs. In each case, a partial insurance program appears to be superior to a universal one. Better still, are more specific public programs to change patterns of service delivery which operate on the supply-side simultaneously with the demand side, thus avoiding the old Hall Commission fallacy that it is possible for public policy to operate on one side of the market but not on the other.

In reaching this conclusion, we have proceeded by laying out the various objectives which a policy-maker might have in formulating public programs for dental or pharmaceutical care.[3] We outlined four major objectives in chapter one, and related them to pharmaceutical and dental services in chapters two and four. The first two objectives are independent of any effect which a public program might have on how care is produced, how much, or who gets it. They are best analysed by the *ceteris paribus* device, of holding constant all aspects of the dental or pharmaceutical system itself, and simply rearranging the bills. These objectives are the pure insurance motive, of reducing the *ex ante* or before the fact risk of financial loss faced by potential users of services; and the redistributional motive of transferring wealth from low users of services to high. It was stressed that these motives are conceptually quite separate, though often confused. Insurance *per se* will transfer wealth from low to high users after the fact, but charges equal premiums to people with equal *expectation* of loss. If high and low users can be identified in advance, a pure insurance system would charge each group different premiums proportionate to their different expectations of illness/use. A wealth transfer program explicitly subsidizes high-use groups by charging premiums lower than expected use, or by financing the whole program out of taxes. 'Spreading the burden of care' as a public program objective, may refer to either motive. But insofar as it refers to the insurance motive, it is necessary to argue that the private insurance market fails, for some reason or reasons, in the health-care case. Insofar as 'spreading the burden' means not insurance but wealth transfer, it must be shown that the resulting high users/beneficiaries are a group that one would wish to subsidize at the expense of society generally. Both these conditions may hold, but neither is automatic.

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[3] We have excluded the specifically political objective which might lead to the introduction of popular programs for re-election purposes (nobody votes against Santa Claus) in spite of their ineffectiveness (which can be hidden) or long-run cost problems (which will be lost in general taxation and the 'inflated' public sector). The responsible policy-maker eschews such cynical selfishness and seeks the public good beyond the next election. But does he/she get elected?

These first two motives have nothing to do with improving anyone's health, at least not through changing health-care utilization, since they can be achieved merely by rearrangement of financial claims without changing patterns of health care utilization or delivery. The general motive of reducing 'barriers to care' however, implies that increasing utilization levels is a further objective of any public program. Certainly it is likely to be a result, whether by changing the financial incentives faced by patients, or by relaxing the internal or external constraints on providers. This raises the important issue of whether further health care utilization is in general conducive to better health, a proposition which while perhaps still generally accepted is being subjected to increasing scrutiny.

Finally, the fourth objective of the policy maker is or ought to be the promotion of the efficiency with which the components of the health care delivery system use up society's scarce resources in producing their outputs of goods and services. Any public program should be judged *inter alia* on the effects which it is likely to have on the economic efficiency of the industries to which it relates. Particularly at a time when the impact of the large and rapidly growing public sector on the productivity of the whole economy is a matter of serious concern, any new public program should be subjected to this scrutiny.

When these criteria were applied above to universal denticare and pharmacare programs, the results ranged from weakly positive to downright negative. On the financial objectives, both programs obviously reduce risk of large expenditures. But for most of the population, that risk is trivially small or non-existent. The elderly face significant risk of high expenditures for drugs, while certain of the chronically ill face large expenditures without these being a corresponding risk.

But for the vast majority of the population prescription drug expense, when it occurs, is a very minor item in the budget. The contrast with hospital expense is marked – many fewer people have any expenses for hospital care in any given year; but when such expenses occur they are invariably large relative to the average household budget. Similarly with respect to dental care, the apparent distribution of expenditures is in fact the result of the postponable nature of dental services. One person may be under continuing maintenance care; another may allow problems to accumulate for several years then have a very large catch-up expenditure. The resulting distribution of expenses across the population in any one year might be highly uneven; but this could not be called a situation of risk. There seems to be relatively little variation in dental expenditures across patients under continuing maintenance care.[4] The conclusion is that the risk-reducing benefits of pharmacare apply only to a small and readily identifiable part of the population (elderly) and that those of denticare are virtually non-existent.

Wealth redistribution benefits are also hard to find, if we regard as a 'benefit' a redistribution in the direction that most people seem to regard as defensible. A pharmacare program would principally benefit the elderly and chronically ill, groups who tend to be on the average less well off than society generally. It would, of course, tax the poor and healthy to subsidize the rich and ill, but the average direction of the subsidy is probably 'right.' Again it should be stressed, however, that this applies only to the small group of relatively well-identified high users; for most of the population the redistributional effects would be small and capricious.

The case of dental care is much clearer. Use of dental care is highly correlated with socio-economic class; a relation which turns out to be little affected by insurance. Thus public dental insurance would bring about a net wealth distribution from lower to upper income groups, unless some mechanism could be found to stimulate more general utilization. (Of course such a mechanism would greatly increase over-all program costs unless increased efficiency could be achieved in the delivery system.) Moreover supply constraints and resulting non-price rationing will bear more heavily on present non-users who try to respond to insurance, further reinforcing the poor-to-rich redistributional effects of dental insurance.

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[4] We exclude accidents, which are of course already insured through the hospital system, and cosmetic dentistry which while potentially very expensive is also highly discretionary.

Moving from financial to health care effects, both pharmacare and denticare would tend to stimulate utilization. The estimation of the scale of this effect is unfortunately very uncertain. From the point of view of public policy, however, the problem is that use of prescription drugs is probably too high already. There may be particular individuals who cannot afford drugs they 'need' in the sense of drugs which would improve their health. But insurance is not selective, it stimulates all use. And on average such increased utilization is likely to have negative effects on health.

By contrast, increased use of dental care seems generally agreed to have positive effects on health, and this must be accounted a positive benefit of denticare. Here the problems are two-fold. First, the impact of insurance on those who do not now receive regular dental care is distressingly weak. In fact, in the short run the interrelation between insurance and dentists' practice location decisions could *reduce* access for residents of remote areas as dentists are more able to make a living in the more desirable metropolitan locations. Secondly, the tendency for dentists to over-service existing patients in the presence of insurance represents increased utilization of which the impact on health is small or zero, and could conceivably be negative. Still, the direction of effect of denticare on utilization is clearly positive in the sense of improving general health levels, unlike that of pharmacare.

Finally on system efficiency, both programs have unambiguously negative effects. They remove any market constraints on pricing which now exist, substituting for them negotiated-administered pricing. This in turn removes most of the strength of competitive incentives to increase efficiency, since negotiated prices tend to be based *inter alia* on actual costs. Of course one may reasonably argue that such market forces are not effective in regulating the existing private market for prescription dispensing or dentistry, and there is much evidence to support this position. But the advantages which could be gained from a rationalized and more efficient delivery system in both pharmacy and dentistry, particularly from much more extensive delegation of tasks to auxiliaries, are potentially very large. An insurance-based program, by freezing in place the existing delivery system, would permanently foreclose those benefits and remove the opportunity for significant productivity increases. Alternative public programs to stimulate simultaneous change in the delivery system can be designed to avoid these effects.

Taking account of the rather doubtful benefits and the significant costs, monetary and otherwise, of universal pharmacare and denticare, it appears that partial plans would be superior. Table 7 shows the estimated cost of a pharmacare program for the over-65 population only, which would have almost all the

TABLE 7

Estimated expenditures for partial pharmaceutical insurance programs (Ontario 1975)

Program for over-65 population		
Population over 65		708,000
Estimated prescriptions per person over 65		14.38
Estimated average cost per prescription		$5.58
Total program cost assuming 10-25 per cent utilization response and 20¢ per prescription administration cost		$65.0-73.9 million
*Universal program with deductible**		
$50 deductible	– program costs	$73.6-83.7 million
	– private out-of-pocket costs	$180.8 million
$75 deductible	– program costs	$27.4-31.1 million
	– private out-of-pocket costs	$221.2 million

SOURCE: chapter two

* assumes utilization response on insured component only

wealth transfer and risk-reduction benefits of a universal plan while avoiding most of the utilization and efficiency costs and would cost $65.0-73.9 million.[5] Even better, from a risk-reduction point of view, would be a deductible plan which would protect the whole population from exceptionally high expenditures. A $50 deductible plan might cost slightly more, $73.6-83.7 million; but a $75 deductible plan might cost as little as $27.4-31.1 million. Of course, deductible plans reduce the direct subsidy to the aged; they do however have the important additional benefit of exposing all drug buyers to price signals for part, at least, of their annual expenditures and thus potentially maintaining more competitive pressures on suppliers.

As shown in Table 8, however, a public program which could stimulate greater efficiency in pharmaceutical delivery could lower the total unit costs of drugs by as much as 28-37 percent.[6] Such a program would be superior to pure

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[5] We are aware that such a program already exists, and that its 1975 costs when available may differ from these. The purpose of this exercise was to develop a set of costs for alternative programs on a consistent basis, a purpose which would not be vitiated if costs of the actual program turn out differently. The point at issue would still stand, that such a program as now exists represents, not a step on the way to universality, but a superior alternative.

TABLE 8

Estimated potential reductions in total costs of pharmaceuticals in Ontario in 1975 from rationalizing the dispensing and wholesaling process

Estimated reductions from rationalization of dispensing	11.4-16.7 per cent
Estimated reduction from rationalization of wholesaling and distribution	16.7-20.0 per cent
Total estimated cost reductions	28.1-36.7 per cent
Baseline estimated cost of pharmaceuticals in Ontario, 1975	$245.2 million
Costs of rationalized drug distribution program, assuming public program covers wholesale drug costs – total costs	$155.2-176.3 million
– public program	$ 73.6- 81.7 million
– private, out-of-pocket	$ 81.7- 94.6 million
Estimated utilization response*	6-17 per cent
Total program costs after utilization adjustment – total cost	$164.5-206.3 million
– public program	$ 78.0- 95.6 million
– private, out-of-pocket	$ 86.6-110.7 million
Estimated costs of universal pharmaceutical insurance	$280.4-318.6 million

SOURCE: chapter three

* Calculated by combining the estimate of 10-25 per cent for a universal insurance program with the estimated reductions in out-of-pocket costs of 61.4-66.7 per cent in a rationalized system.

6 Throughout, we have implicitly equated ‘efficiency’ with reduced expenditures for a given level of dental or pharmaceutical services, including public program and private out-of-pocket costs. We are aware that in an industry characterized by large economic rents to providers, a given cost reduction may represent not an increase in technical or allocative efficiency but merely a redistribution of these rents to consumer surplus or lowered taxpayer burden. Moreover we argue in chapter six that the creation and maintenance of these rents by the owner-managers of health service firms is the primary explanation for the technical inefficiency of such firms.

In general, we have calculated potential unit cost reductions on the assumption that the net incomes of providers remain constant, hence so do their economic rents. Pure allocative efficiency gains have not been calculated, though it would not be hard to do so given the estimated price and quantity changes, in fact as the literature on the ‘welfare burden of insurance’ tells us, allocative efficiency benefits are likely to be negative. In general all benefit estimations are reductions in Leibenstein’s (1976) ‘X-inefficiency.’ An exception would be reductions in drug manufacturers’ profits from their current ‘above-market’ levels – these represent economic rents. Since most of the large drug companies are foreign-owned, however, these rent reductions are net gains to the Canadian economy.

insurance, which while transferring the cost of drugs from the private sector to the public, can only increase the total burden which will in the end be borne by private taxpayers. To achieve this result, a program is suggested akin to that of Saskatchewan whereby the provincial government enters drug wholesaling, either directly or through private agents, to bid down drug manufacturers' supply prices through bulk buying. Drugs are then supplied free to the retail level and thence to the patient. But the patient pays a dispensing fee which each pharmacist must set independently and can advertise. More detail is supplied in chapter three, along with the basis for the quantitative estimates. A critical part of the program, however, is that patients must continue to pay the dispensing fee, and the amount the patient pays is variable and directly linked to what the dispenser receives.[7] Unlike the flat charge per prescription, such a program maintains and strengthens efficiency-promoting incentives in the drug delivery system. Such strengthened incentives are consistent with reduction of the average out-of-pocket cost of drugs to the patient by as much as two-thirds. If further protection against high expenditures were needed a deductible plan could be included at very low cost, for, e.g., those whose out-of-pocket costs for dispensing alone still reached $50 in any year. The numbers involved would be very small.

The potential benefits of improved efficiency in dental care through increased use of auxiliaries and more careful definition of optimal service mix also appear to be very large. Except in the case of children's dental care, however, the literature does not provide a basis for their quantitative estimates with any great degree of confidence. Moreover, specification of a policy to achieve those benefits is much more difficult because the problem of product definition is so much more severe in dentistry than in pharmacy and the potential for reliance on competitive forces correspondingly less.

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[7] This is a very important distinction relative to, e.g., a 'well-administered' public program of universal coverage. Tight administration might limit unnecessary prescription drug utilization, and might restrict excessive dispensing charges by refusing to reimburse pharmacists charging more than x per cent above mean fees for a given pharmacy class. Over time, such an approach can cause dispensing fees to converge to an industry norm and prevent 'rip-offs.' If the industry is characterized by excess capacity, however, the administered price will be too high owing to the unnecessarily high industry cost structure. Unlike the competitive market, which will redistribute patients towards the lower-cost dispensers, the administered system has no mechanism for squeezing out this excess capacity. Nor does it provide any means for measuring the strength of consumer preferences as between lower dispensing costs versus proximity or other forms of convenience. Yet this is a crucial determinant of the optimal geographic structure of dispensing outlets and thus scale of operations.

TABLE 9

Estimated costs of alternative public dental programs

Public dental insurance for children aged 3-17 – 70 per cent utilization (most probable)	$ 95.1 million
– *80 per cent utilization (possible with outreach)	$109.6 million
– *90 per cent utilization (implausible)	$123.2 million
Public school-based, children's dental care program – 90 per cent utilization	$81.2-87.5 million
Universal program of extensive auxiliary use, in adult and child dentistry, competitive forces to adjust dental fees – potential unit price reductions	30-40 per cent
Very speculative estimate of cost of universal, optimal dental care in Ontario if optimal use is made of auxiliaries	$348.8-449.0 million

SOURCE: chapter five

* Includes $0.9 million cost of outreach

The literature on children's dental care programs is now fairly extensive, as increasingly is field experience. A discussion of these sources in chapter five leads to the estimates in Table 9 that a private practice-based children's dental insurance program in Ontario in 1975 would achieve utilization levels of 70 per cent and would cost $95.1 million. The most optimistic utilization assumptions could raise these figures to 80 per cent and $109.6 million. A school-based public delivery system built around dental nurses or therapists would by contrast attain utilization levels of 90 per cent at an estimated cost (using conservative, i.e. upwardly biased, assumptions) of $81.2-87.5 million – after an initial period of backlog reduction and phase-in costs. The importance of high utilization levels in any such program cannot be over-stressed, both in terms of achieving an improvement in levels of dental health and in preventing the program from acting as a wealth transfer mechanism from lower to higher income groups.[8] If a corresponding 90 per cent level could be achieved in a private practice-based plan, estimated costs would be $123.2 million; but all experience with insurance-type plans shows that such levels cannot be achieved.

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[8] Of course not all children may use the public program, particularly in its first years. From the point of view of public policy, the key issue is total utilization rates. As discussed above (chapter five) these may have been above 90 per cent in the first year of the Saskatchewan Dental Plan even though utilization of the school-based program itself was only 75 per cent. In the second year, the program utilization rates were 83.7 per cent, so that total rates were almost certainly over 90 per cent.

In the case of adult care, everything becomes much more vague. The literature will support outside estimates of potential reductions in unit costs of dental care in the neighbourhood of 30-40 per cent, given full introduction of dental auxiliaries and reorganization of dental practice to make full use of them. Really optimal auxiliary/dentist ratios, using dental nurses (with assistants) for much of adult restorative care, and dental hygienists and certified dental assistants for periodontal and preventive care, seem to be in the neighbourhood of at least five to one and perhaps closer to ten to one, compared with current practice in the two or three to one range (on average). If such savings in unit costs of 30-40 per cent were attainable, the universal 'optimal' dental care program for all Ontario residents, adult or child, would cost not the $641.4 million estimated under current modes of delivery, but $384.8-449.0 million. Such numbers must be treated as *extremely* speculative; nevertheless, it is interesting that they suggest that an efficiently-organized delivery system making extensive use of auxiliaries might be able to provide optimal dental care for the whole population at about the same total cost as the existing system (combined with universal insurance) will require for 60-70 per cent of the population.

But how to encourage such a transformation of dental care, and equally important to assure that its benefits are passed forward to consumers in terms of lower costs for dentistry, is very far from clear. Several different broad alternatives seem to emerge, and their apparent strengths and weaknesses are sketched in chapter five. One could try to apply competition policy more rigorously to dentistry as it is organized at present, while transferring the power to regulate internal practice organization from professional organizations of dentists back to the provincial government. This is a critical part of any enhanced competition policy, as made clear in chapter six. More radically, one could provide for independent licensure of restorative dental therapists (dental nurses) or periodontal dental therapists (dental hygienists) and permit them to practice independently as denturists now do in Ontario. One could begin to introduce free public dental clinics with very high auxiliary/dentist ratios, for example in conjunction with community health centres or their equivalent. One could encourage large multi-practice 'dental contractors' to emerge and bid for private insurance contracts on a closed panel basis as appears to be happening in California. All these approaches seem at first glance to have significant problems as well as potential advantages, so it is obvious that in this area at least 'further research is needed.'

One conclusion seems clear, however. The optimal policy is definitely *not* to introduce a universal public dental insurance program, whether or not festooned with coinsurance gimmicks or specific procedural limitations. Such a policy would ensure that the potential major transformations of dentistry do not occur, while the slow and steady increases in average productivity which will doubtless continue in the future as they have in the past will, as in the past, emerge as higher provider incomes and/or greater leisure time, rather than as reductions in dental service prices.

At this point the reader might reasonably ask why, if universal public dental insurance appears to be a program of such dubious utility, is private dental insurance expanding so rapidly? Are not private individuals showing that they place a high value on this service, even if as Frankel and Boffa (1974) describe it, the service is one of budgeting rather than insurance; and should the public sector not then take steps to provide it to everyone? Perhaps we have simply failed to identify society's true values.

The question is an important one, deserving of further study than we shall be able to give it here. We can, however, provide a brief outline of possible explanations; noting particularly the importance of the distinction between individual and group purchase of insurance. The discussion in appendix A, like that of most other analysts, has treated the insurance purchase as an individual decision made by each consumer independently, but in fact most private dental or pharmaceutical insurance is sold as group coverage and the dynamics of that consumption decision may be different in important ways.

Dealing first with the individual-level decision, people may over-insure because of ignorance or irrationality in a broad sense. This is a hypothesis which economists tend to avoid for good methodological reasons; if behaviour is the result of irrational, uninformed, or plain stupid decision-making, it tends to be rather unpredictable and its analysis less fruitful. Nevertheless, Eisner and Strotz (1961) have shown that the individual purchase of air travel insurance, for example, is difficult to explain on rational grounds, at least as expressed by the Von Neumann-Morgenstern axioms. In general it is rational to ensure a specific *loss* (depending on the cost of insurance) but not a specific *cause* of loss, unless the specific cause loss coverage is significantly cheaper than the general coverage. In fact, given the very low probabilities of loss, air travel insurance is much more expensive than general life insurance. The most plausible explanation of the purchase of air travel insurance, then, is imperfect knowledge by purchasers of the true probability of loss/price of insurance. The same may be true of dental or pharmaceutical insurance, consumers may be purchasing on imperfect information about expected loss, or more relevantly the amount of expected loss reimbursed, and about the true price of coverage. This would be consistent with an often expressed view by members of private insurance plans that they are getting or will get back in benefits more than they put in as premiums. This may be true for some, but as noted it must be false for most or on average. Mossin (1968) also notes that apparently irrational over-insurance is not an uncommon phenomenon and discusses some of the conceptual and informational difficulties involved in achieving optimal coverage in a world of complex multi-period optimization strategies.

Another related source of illusion or error is the belief by employees that coverage paid for by the employer is free to the employee. The obvious trade-off of fringe benefits against salary is often ignored by employees and downplayed or denied by those marketing insurance plans. Employers of course are well aware that in payroll costs a dollar is a dollar whether spent on direct wages or dental insurance, and the Anti-Inflation Board administration of wage and price controls should have made this trade-off clear. Nevertheless individual workers may still suffer from the free services illusion, an illusion which is all the more severe with respect to government programs. Many people speak and act as if government services were free. And of course to the individual they are – once a program has been established. If the question is whether or not to establish a program, however, the real issue is not free versus costly services but how to pay for services and how much to pay.

Explanation of over-insurance as the result of imperfect information or illusion about who pays may be contrasted with what one might call the 'hyper-rational' explanation which is favoured by some US students of the problem. The role of the income tax system in distorting insurance choices toward over-insurance is much stressed, particularly by Martin Feldstein (see for example Feldstein and Allison, 1972; M. Feldstein, 1973a; Feldstein and Friedman, 1974; and on distributional effects see Mitchell and Vogel, 1975). The US tax system permits the employer to deduct as a payroll cost premiums paid by him on behalf of an employee, but does not require the employee to include these benefits in his taxable income. Thus employer-paid premiums come out of before-tax dollars, whereas employee-paid premiums or direct expenditures on health care are made from after-tax dollars. Such direct expenditures and employee-paid premiums are only deductible from taxable income to the extent that they exceed 3 per cent of taxable income. Measurements of the economic costs resulting from this distortion, over the whole US health system, have been reported to run in the billions of dollars. Moreover, the distributional effects are such as to favour high-income groups over lower-income ones, since like any other tax deduction provision the deductibility of employer-paid premiums is most beneficial to high-tax-bracket workers.

At the individual level, however, this argument is a hyper-rational one in that it assumes a degree of familiarity with the tax system and sophistication in tax avoidance which is probably beyond most professors of economics, let alone the average citizen. In Canada the argument requires even more sophistication since the tax laws require some employer-paid premiums to be added back to the employee's income as a taxable benefit. Premiums for the universal provincial hospital and medical insurance programs must thus be added back and so are taxable to the employee whoever pays them; premiums for voluntary private plans such as dental or pharmaceutical insurance are not, (Canada, Department of National Revenue Interpretation Bulletin No. IT-71R, 18 April 1977). In principle, then, there exists in both countries a tax-induced stimulus to over-insurance in the latter areas. But the assumed degree of individual information and rationality is absurd, as can easily be tested by asking any randomly selected group of taxpayers whether all, or any, of their employer-paid fringe benefits are added back as taxable benefits. The results of such an informal survey do not appear to change if the group includes those employees at regional income tax offices who answer questions from the public. Of course economic methodology regularly ascribes highly sophisticated behaviour to economic man despite apparent ignorance – which raises the interesting question of why political man is so stupid as to support such a tax system.

At the group purchase level, however, the hyper-rational explanation becomes more plausible. Particularly in large employee groups one finds agents or consultants specialized in the fringe benefit field who are familiar with tax law and have no illusions about the independence of wages and fringe benefits. Such advisors are also in a better position to evaluate risks of loss and true costs of coverage. Thus one might argue that a union, for example, negotiates over insurance rather than direct salary in order to maximize its members' after-tax benefits. This, however, requires a model of union behaviour parallel to what is known elsewhere in the health care field as the complete agency model – the union acts as a perfect agent and never as principal. If the union executive/negotiating teams are viewed as playing a mixed role, part principal, part agent, the world becomes much more complex and the linkage between employee interests and union choice less clear. Union negotiators appear to present their achievements in before-tax terms, as easier to communicate, and while they may be aware of tax implications this does not appear to be communicated to members. If the members are not aware of such factors, why should negotiators be influenced by them? On the other hand, the existence or non-existence of a particular fringe benefit program is easily observable and comparable across employee groups. The politically potent observation, 'They've got a dental program and we don't,' is hard to counter by referring to specific cents-per-hour differentials. The union leadership may have an interest in achieving programs to which it can point with pride, even if in fact the members would be better off without them. The negotiating process itself is also smoother if there are a variety of different chips on the table, it is easier to reach a compromise in which both sides save face than if there is only one issue and winners and losers are clearly identified.

The group purchase of insurance opens other possible explanations for apparently irrational over-insurance, beyond those of conflict of interest between group leadership and membership. Group purchase, as Goldstein and Pauly (1976) point out, makes health insurance analogous to a local public good and raises the usual public-good problems of efficient combination of individual preferences when the same quantity of the good must be consumed by all group members. They show that if employees are perfectly mobile, and fall into a relatively small number of discrete categories of preferences with respect to insurance (where 'relatively small' depends on the degree of scale economies in insurance contract administration and the size of the total workforce), then an equilibrium can emerge in which workers sort themselves into groups internally homogeneous with respect to preferences over direct wages or employer-paid insurance. In each group the marginal revenue product of labour is equated to direct salary plus fringe benefit cost, but the mix differs across groups.

If, however, mobility is not perfect, and/or if employee preferences form a continuum and cannot be neatly grouped, this equilibrium cannot emerge. Goldstein and Pauly observe that if the level of insurance is set by the employer each group will contain a balance of over-insured and under-insured members. If the union selects the coverage level, however, it will simply be set to suit the largest group of workers (or a majority coalition). Goldstein and Pauly suggest that employer choice thus takes account of all worker preferences, unlike union choice, which reflects those of the politically dominant group. It should be noted, however, that they assume implicitly that all workers in each preference group are on the margin where the wage plus fringes received equals not only the marginal revenue product of labour but also the worker's opportunity cost (marginal utility of leisure or earnings in alternative employment). Employer choice of the wage/fringe mix is made so as to minimize labour costs, given the expected response of the marginal employee; if all are on the margin then he must take account of every worker's preferences. But if the marginal workers are atypical, because most workers are established and have acquired firm-specific human capital, high mobility costs, etc., then the union choice of coverage may in fact better approximate the preferences of the group as a whole.

The local public good approach to group purchase of health insurance does not in itself lead to an expectation of general over-insurance. In heterogeneous groups some may be overinsured and others underinsured, relative to their own preferences in each case. We may extend the model, however, by reiterating the observation made in chapter four that dental insurance in particular does not seem to induce a major shift in dental utilization (defined as the percentage of the population seeing a dentist in any given time period). If this is true, then a sub-group of employees with a high preference for dental *care* might well push for dental *insurance* as a vehicle for obtaining subsidies from the remainder of the employee group who were less likely to use care. Insurance carriers could then quote over-all premium rates below the expected out-of-pocket costs of the dental care using subgroup. A majority group of users could then enjoy lower costs for dental care, even though total costs for the group as a whole would of course rise. This assumes that non-users are not sufficiently close to the margin that they will leave, but in practice it seems implausible that many employees would quit because the employer introduces a dental plan. Since dental care use is strongly associated with socioeconomic status, the probability of the users gaining a political objective over the non-users in an employee group is enhanced, even if the users are not in fact an absolute majority. The extensions of this mechanism into the public domain are obvious, as are its implications for denticare.

Thus although it is possible to argue that over-insurance is the result of hyper-rational individuals or their (perfectly selfless) agents responding to tax inducements, a more plausible explanation seems to be a combination of imperfect information at the individual level and intra-group transfers at the group level. (Yet another suggestion is made by Frankel and Boffa, 1974, 53, in noting that dental prepayment is not insurance but a budgeting service – perhaps so, but there are many alternative ways of budgeting irregular payments, such as credit cards, which do not involve such extreme side effects!).

Whatever the source of over-insurance, we would argue that the important issues relate to its effects. The focus of the US hyper-rationality or tax-distortion explanation has been on the demand-side impact of over-insurance – tax deductions are bad because they make insurance cheaper, which thus lowers point-of-service charges for health care and encourages over-consumption. As noted above, this argument depends critically on the concept of an independent demand curve for health services; and there are good grounds for believing that such a curve (i.e., utilization as a function of price expressing buyer's preferences alone) may not exist. In any case, the postulate that society has an interest in health care utilization levels separate from the individual's own expression of preferences – that private utilization decisions may be 'too high' or 'too low' – undercuts the policy significance of the conventional demand curve insofar as it exists.

What is being stressed here is that over-insurance is bad because of its effects on the *supply* side. We have seen that a universal dental insurance program would tend to perpetuate a very high-cost mode of providing dental services and to make more difficult its replacement either by a more competitive and efficient private system or by a public program based on extensive use of auxiliaries. All the criticisms of a universal public dental insurance system above apply to a widespread private system as well, except that a private insurance system will have somewhat less general coverage, will probably continue to embody some forms of 'deterrent' coinsurance, and will be less capable of restraining either dental fees or excess service provision to the existing patient population. Insofar as extensive private insurance conditions the expectation of patients concerning the 'appropriate' forms for public dental programs, it will tend to foreclose options which may be both more efficient economically and more effective in promoting dental health.

These criticisms of widespread private insurance coverage, however, apply on the assumption that such insurance will continue to be focused on the demand side only. A private insurance program which began to integrate insurance and delivery system functions, either by imposing constraints on participating providers or by operating its own clinics, dispensaries, or other delivery institutions, might well be able to improve its competitiveness by passing savings on to consumers in the form of lower premiums. More recent US work, particularly that of Havighurst (1976), focuses on the relationship between the income tax system and overinsurance more in terms of its effects in inhibiting this sort of evolution on the supply side of health services delivery than as simply promoting excess health care consumption. Overinsurance (especially first-dollar coverage) reduces consumer cost-consciousness and makes it more difficult to promote more efficient delivery system alternatives. This reinforces professional restrictions on the supply side which impose legal or extra-legal sanctions on insurance carriers or other organizations attempting to improve the efficiency of health care delivery. In such an environment the spread of a particular form of private dental insurance is no guide to what consumers would choose if they were given the opportunity of selecting from the full range of possible dental delivery systems, and were faced with paying the costs associated with each.

There are thus several types of reasons why private dental insurance might expand even though a universal public program might not be in the general interest. The principal long-run cost of dental insurance, apart from its wealth redistributional effects, is its opportunity cost in foreclosing important changes in the structure and efficiency of dental care. But to a private individual or group contemplating the purchase of private dental insurance this is not a cost simply because no such individual transaction is large enough to influence the evolution of the dental care delivery system. The aggregate of all such decisions, a universal or even widespread system of private dental insurance, would be even worse than a public system as it would have weaker (or non-existent) cost and utilization controls. But it is precisely one of the public finance responsibilities of the state to step in when the aggregation of all individual privately-optimal decisions in a particular area leads to a socially sub-optimal result (The 'Prisoners' Dilemma' game writ large). The form of the necessary public policy intervention, however, is not in general to move directly to the sub-optimal outcome by following and extrapolating the individual private decisions!

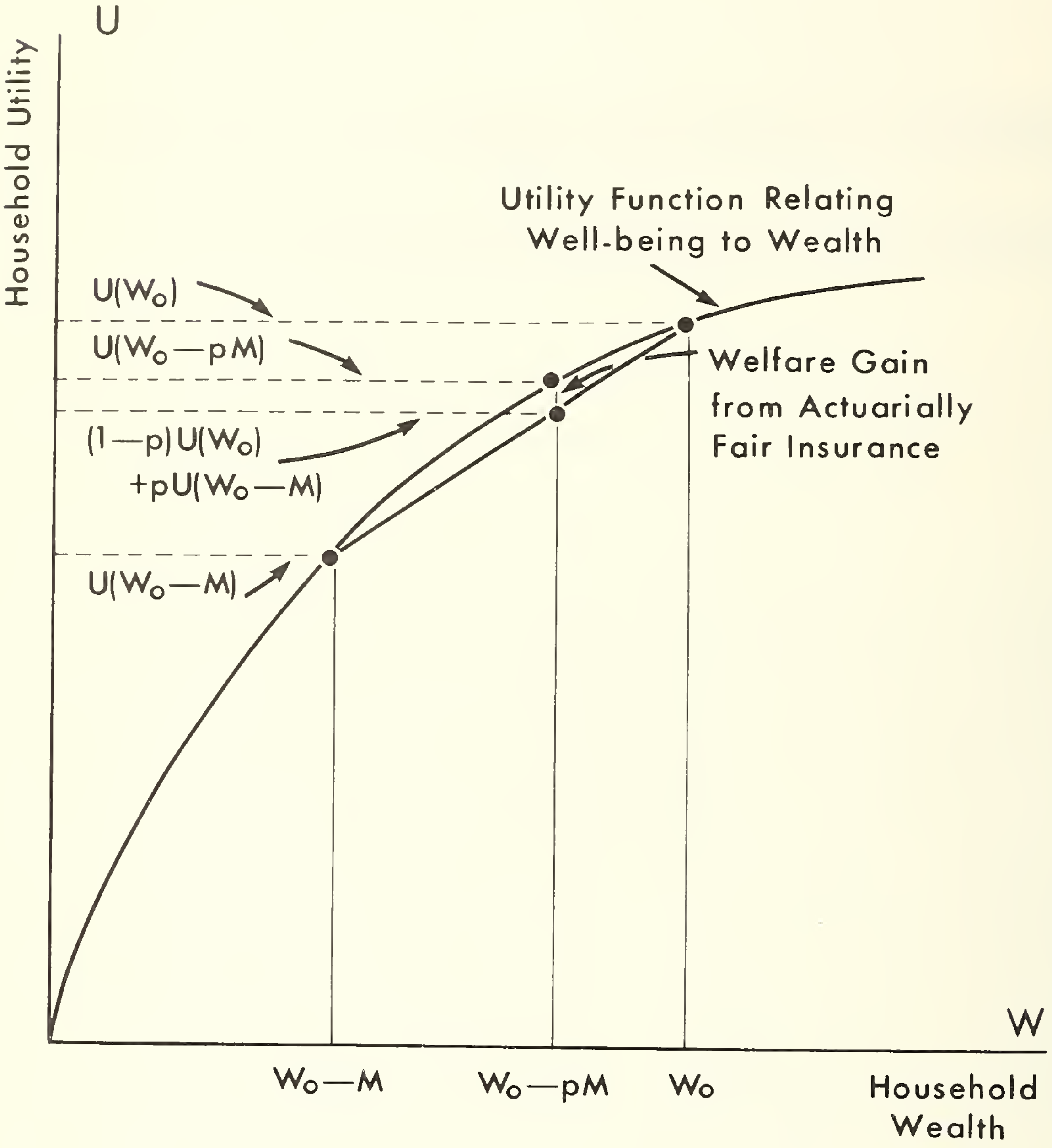
APPENDIX A

Risk-spreading and the gains or losses from insurance: a graphical analysis

The line of reasoning developed in the second section of chapter one, on the spreading of risk, can be illustrated by the use of a highly simplified example. Suppose a household anticipates two possible situations during the coming year. Either everyone in the household will remain healthy in which case health care bills will be zero, or a specific illness will strike, generating costs $\$M$. In the first case wealth at the end of the year will be $\$W_0$, in the second, $\$W_0 - \$M$. If the probability of illness is p where $0 < p < 1$, then the mathematical expectation of end of year wealth is $p(W_0 - M) + (1 - p)W_0$, or $W_0 - pM$. But because this expectation of outcome is made up of two possibilities, W_0(with probability $(1 - p)$) and $W_0 - M$ (with probability p) it embodies a degree of risk and is therefore inferior to a certainty of $W_0 - pM$. If the household could, by paying a premium $\$pM$ at the beginning of the year, buy an actuarially fair insurance policy which would pay $\$M$ in the event that illness occurred and nothing otherwise, it would thereby exchange an uncertain situation for a certain one, with the same mathematical expectation, and be made better off.

This is illustrated in Figure A.1 where the household's welfare or utility is represented as a function of its wealth. The expected welfare is a probability-weighted combination of utility if healthy, $U(W_0)$, and if ill, $U(W_0 - M)$, with weights equal to their probabilities $(1 - p)$ and p, so *ex ante* expected utility is $(1 - p)U(W_0) + pU(W_0 - M)$. If a fair insurance policy can be bought, with premium equal to the expected loss pM, then household welfare rises to $U(W_0 - pM) > (1 - p)U(W_0) + pU(W_0 - M)$ and the household has been made better off through insurance. As can be seen from Figure A.1 the utility gain from insurance falls toward zero as $M \to 0$, as $p \to 0$, or as $p \to 1$, i.e., there is little

Figure A.1
Welfare gain from the purchase of 'actuarially fair' insurance for a risk-averse household facing a possible wealth loss of M with probability P



gain from insuring events which have a relatively small effect on ones wealth, *or* are extremely rare, *or* are almost certain to occur.[1]

The effect of varying M is specifically demonstrated in Figure A.2 where a hypothetical household is faced with two different pairs of uncertain future

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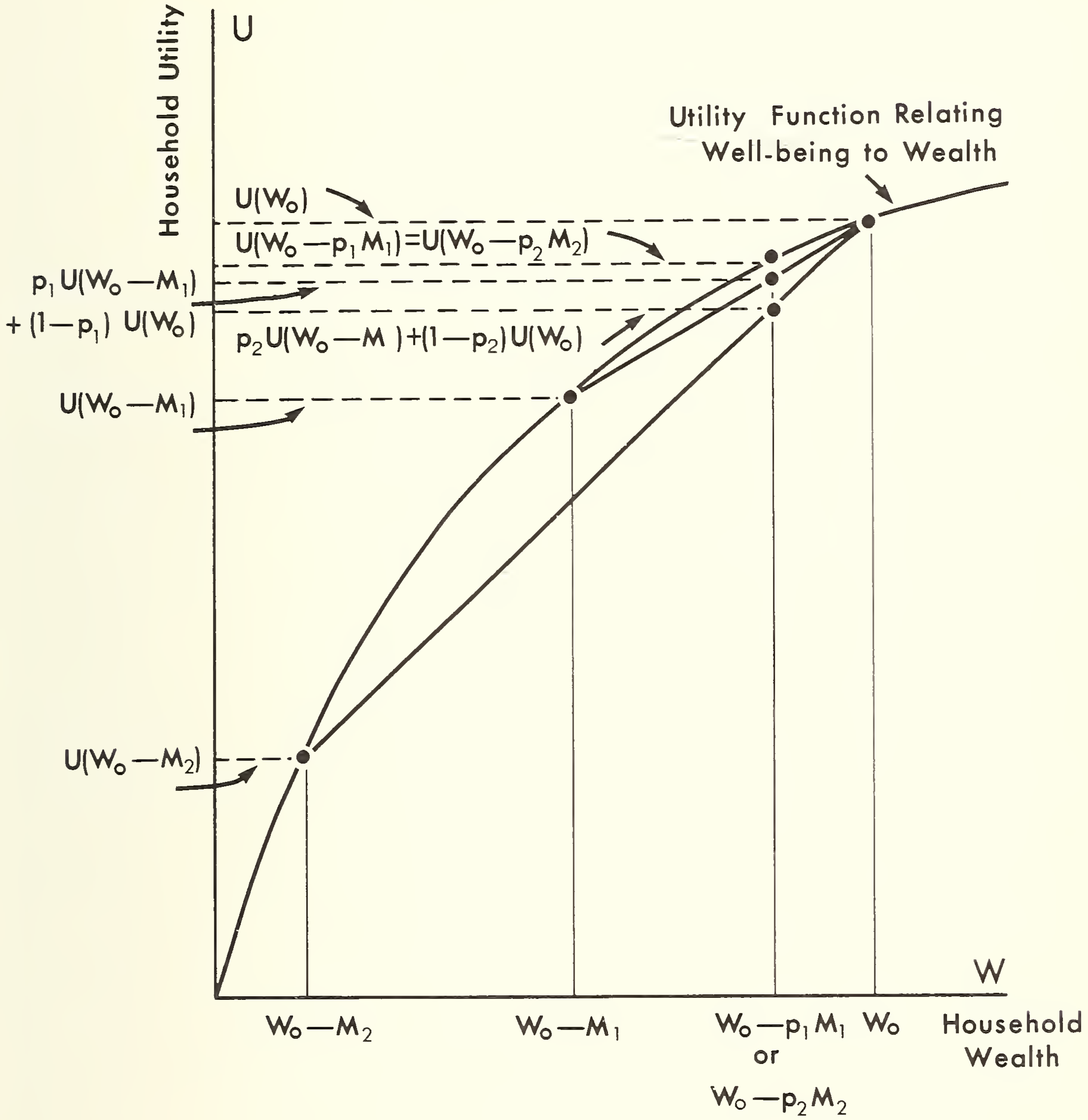
[1] This example has been formulated as if the purchase of insurance were an either/or proposition, full coverage or none. There is of course also the possibility of partial coverage, an individual faced with a probability p of loss M might choose to cover only a proportion of this loss. Mossin (1968) shows that for a risk-averse individual with diminishing marginal utility of wealth such partial coverage would be optimal whenever the premium was greater than the expected loss. We have disregarded this complication because it does not change the general argument of this appendix; as Mossin also shows,

Figure A.2
Differential welfare gain from insuring large, low-probability loss relative to smaller, higher-probability loss with equal mathematical expectation



the optimum proportion of loss to be insured falls to zero as the probability of loss goes to zero or to unity, or as the size of the loss falls relative to total wealth. Moreover, in practice the individual facing a health care loss does not know how large the loss will be (hence undermining the optimality of partial coverage); and the institutional structure of the insurance market does not generally permit the individual to select from a range of partial coverages. Private insurers often sell group contracts with a coinsurance provision; but as Hall (1966, 1974) has pointed out these are usually set on the basis of habits and beliefs of insurance companies about control of unnecessary utilization which are not backed up by any hard evidence.

states. In one pair of futures, the expectation is health, zero expenditure, with probability $(1 - p_1)$, or illness and expenditure $\$M_1$ with probability p_1. In another pair, the possible loss $\$M_2$ is much larger but the probability of occurrence p_2 is correspondingly smaller such that $p_2M_2 = p_1M_1$. As can be seen from Figure A.2 the expected medical payments are the same in each case, and the necessary premium for a full coverage insurance policy is also the same, but the gain from insuring against large loss M_2 is much greater than from insuring against small loss M_1. Moreover for any given M, it is obvious that the benefits of actuarially fair insurance will be at a maximum when the risk of loss p is such that the slope of the utility function at $p(W_0 - M) + (1 - p)W_0$ is equal to the slope of the line joining $U(W_0)$ and $U(W_0 - M)$, and will decline for any p greater or less than this intermediate value.

Although this example refers to an individual household, it presupposes a large group of similar households in order that the insurer can pool risks. In a group of such similar households, a necessary condition for there to be benefits arising from public or private risk pooling is the existence of substantial variance in actual health care spending. High *ex post* expenditure variance is not a sufficient condition for benefit, however, because it may reflect different *ex ante* probabilities of loss. In fact, in an extreme case, one could observe a population in which a proportion p of all families knew in advance that their health care use would be M per year, and the other $1 - p$ (who were not chronically ill with a known condition, or not aged, or whatever) knew that their expenditures would be zero. Such a population would have mean expenditure pM, variance $p(1 - p)M^2$, but would be uninsurable because there would exist no uncertainty and no risk to spread. A private insurance company charging any premium between zero and M per year would make losses, as only those who were going to become ill would sign up, and if it charged a premium M no one could benefit from insurance. A public plan which charged a compulsory 'premium' pM and required all citizens to belong would not in fact be an insurance plan – there being no risk to insure – but a wealth transfer plan which taxed each healthy family pM and paid each ill family a net transfer of $(1 - p)M$. (A payment of M made up of a return of their own payment pM plus a net transfer of $(1 - p)M$ from taxes on healthy families). It is critical to keep this distinction in mind – such a plan might still be a desirable public policy if society's political values supported such cross-subsidization. And for cosmetic reasons it might be called social 'insurance.' Such cosmetics have the disadvantage, however, of leaving one without a word to describe the risk-pooling process *per se* which is traditionally referred to as 'insurance.'

The failure of private insurance markets to develop in such a hypothetical world of 'ill' and 'healthy' families would not be a failure in private risk-bearing markets. A public program could not be legitimately justified as a remedy for such failure. A more realistic description of the Canadian situation in health care, however, is a mixture of *ex ante* variation in expected needs for care and pure uncertainty. The population can be ranged along a spectrum from low to high values of p (and M), they are neither all concentrated at a single p nor split into two groups with illness probabilities zero and one. Under such circumstances a theoretically perfect insurance market would have to charge each individual or household a premium equal to his/her/its own individual p_iM_i, the mathematically expected total health expenditures for that particular ith consumer. In fact, of course, the private market cannot tailor-make premiums to each household but rather establishes risk classes and charges different premiums to each just as it does in other commercial insurance markets. The existence of variations in risk expectations is no justification for public intervention, or at least not for intervention on *risk spreading* grounds. Under such a situation, different households would pay very different premiums and some high-risk households, e.g., the aged, might not be able to afford coverage at all. But it must be stressed that this is not necessarily a failure of risk-bearing markets – it may simply reflect the fact that on average people in high-risk groups cannot afford the care they need. If they are to receive such care, someone else must pay for it.

The private market does begin to break down, however, when account is taken of three major qualifications to the actuarially fair premium – i.e., loading charges, adverse selection, and moral hazard. The loading charge reflects the fact that running an insurance plan costs money, so the premium charged must be greater than the amount expected to be paid out in claims. If a percentage d of claims must be paid for the expenses of running the plan, then the individual who contemplates buying insurance will do so only if $U(W_0 - (1 + d)pM) > (1 - p)U(W_0) + pU(W_0 - M)$. Obviously for some d large enough, this will not be true. Adverse selection arises insofar as a knowledge differential exists between insurer and insuree as to the true value of p. The seller of insurance policies must estimate the value of p for groups of buyers, and if buyers have additional information about their expectation of illness then those with higher p will tend to buy insurance. The more discretion individuals have about purchasing insurance, the greater the danger for the insurer that he will find himself covering the worst risks. Thus an insurer offering individual policies to a group of households and unable to differentiate among them in expected risk must set the premium rate above the average expected loss rate for the group as a whole on the anticipation that the sub-group who actually buy will have a worse than average loss rate. The better than average risk in such a group of households will thus face an unfair premium, and if the premium is sufficiently unfair the contract may not be worthwhile. Finally moral hazard, or in another context demand elasticity, reflects the fact that p, the probability of illness, is for the insurer simply the probability of using health services. If insurance leads to additional utilization, that is equivalent to increased 'illness' or rising p. Hence the insurance premium must be p^1M where $p^1 > p$ reflects the increase in probability of expenditure arising from insurance coverage. Again, if this response is large enough, the inequality $U(W_0 - p^1M) > (1 - p)U(W_0) + pU(W_0 - M)$ may not hold. This phenomenon differs from adverse selection in that it refers to the utilization change in a given household in response to insurance – adverse selection makes no assumptions about any changes in utilization behaviour in particular households but only assumes that households with higher risk will be more likely to purchase insurance (and that sellers of insurance cannot accurately measure this risk in each case).

Figure A.3 represents a possible situation in which public insurance might be justified from the point of view of an individual household. The household has a probability p of incurring loss M; as in Figure A.1 this implies an expected loss pM and a gain in welfare from pure insurance of $U(W_0 - pM) - pU(W_0 - M) - (1 - p)U(W_0)$ which is always positive since the utility function displays diminishing marginal utility of wealth. But real life, non-ideal insurance policies embody both administrative charges $d > 0$, and increases in claim expectations $p^1 > p$ due to insurance. Thus the true comparison is between $pU(W_0 - M) + (1 - p)U(W_0)$ and $U(W_0 - (1 + d)p^1M)$. Clearly the latter term is less than the former for d or $p^1 - p$ sufficiently large. In Figure A.3, the policy with administrative charge d_1 and probability of use $p_1{}^1$ is bad, because it is too costly to be worthwhile. The household would be better off to self-insure even though there is a possibility of large losses, because the cost of insurance is simply too high. However, a policy with $d_2 < d_1$, and/or $p_2{}^1 < p_1{}^1$, is such that, though more costly than ideal insurance, it still represents a net welfare gain. This illustrates the fact that, on balance, insured health care is not only not 'free,' but is in fact more costly on average than uninsured care. But the extra cost may be justified by reduction in risk.[2] If plan 1 represents the best private market plan, and plan

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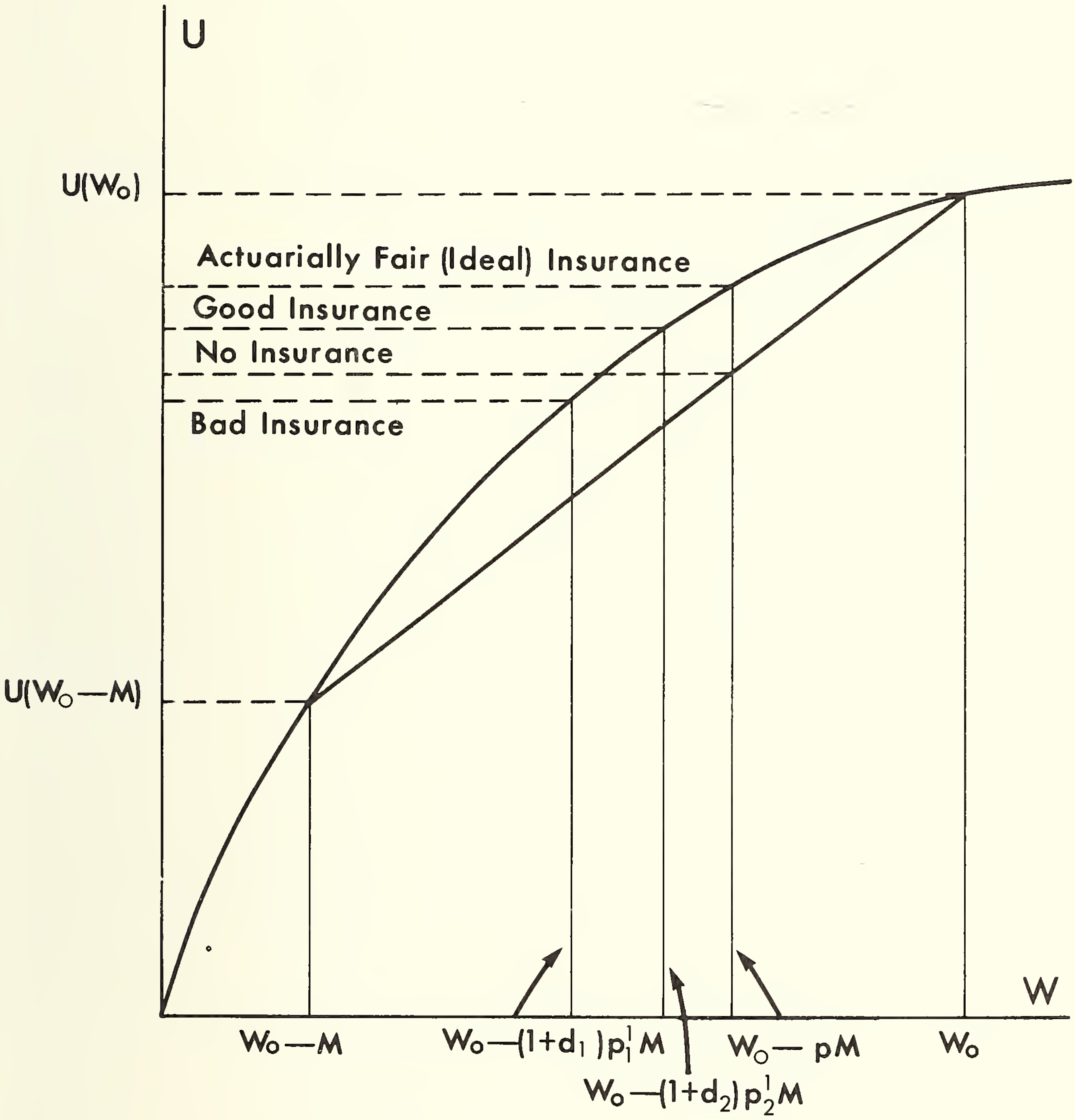
[2] This refers only to insurance *per se*. If insurance were combined with a successful preventive care campaign, it is conceivable that $p^1 < p$; or if the insuring agency introduced efficiency increases or cost control measures lowering M then the resulting premium could conceivably be lower than pM. But such programs are additional to the insuring function, and require a much closer relation between insurer and either users or providers than is necessary simply to pay claims. In general the preference of providers for 'arms length' private insurance companies which will not be able to influence p^1 or M directly is *inter alia* a reflection of the fact that increases in p^1 and M represent increased provider incomes.

Figure A.3
Welfare gain (or loss) from insurance relative to 'actuarially fair' insurance and to no insurance. 'Good' insurance has low load factor/moral hazard/adverse selection; 'bad' has high



2 represents a universal, compulsory public plan, a rational household would refuse to buy private insurance but would vote for a public plan. This illustration is a *possibility* only, it is quite possible also that for small M and very small or large *p* neither the public nor the private plan is worth buying.

APPENDIX B

Estimated cost of a deductible pharmacare program compared with Manitoba (1975) experience

While much lower than the costs of a universal program, the costs estimated in chapter two for a $50 deductible pharmacare program are still relatively high compared with the first year's experience of the Manitoba pharmacare program. Unpublished data from that program in 1975 report a total cost of $4.15 million, for coverage of 1.071 million people. Expanding this to the estimated 8.237 million Ontario population would yield a total cost of (8.237/1.071) X 4.15 = $31.92 million, or less than half our estimates.

In attempting to reconcile these, it should be recalled that the Manitoba program has a 20 per cent coinsurance feature. The beneficiary is only reimbursed 80¢ out of every dollar of drug expense over $50 in a given calendar year. Thus the total expenditure in the absence of such coinsurance would have been $31.92/0.8 = $39.90 million. Moreover the Canadian National Health and Welfare (1975) report on national health expenditures in Canada shows that in 1973, *per capita* expenditures on prescription drugs were $23.73 in Ontario compared with $19.19 in Manitoba. This 23.66 per cent difference might be due either to price or to utilization factors, but if a similar difference prevailed in 1975 it would justify raising the $39.90 million program cost to $49.34 million. Finally, the 20¢ per prescription administrative cost estimate amounts to 3.94 per cent on an average prescription price of $5.07 which would increase the total to $51.35 million.

The remaining discrepancy is difficult to explain. Comparison of functioning programs with data drawn from surveys of utilization and expenditure is often difficult because programs are usually based on family groups associated with a single subscriber or participant while surveys tend to focus on individuals. This effect should, however, tend to bias the costs of a Manitoba-type program *upward*, since the proportion of total expenditures made by families with over $50 in expenditures will obviously be larger than that by individuals.

There would seem to be four possible sources of error. First, there may be a number of families in the utilization range just above $50 who have failed to make claims. Such families may have failed to keep the necessary records, etc. because they did not expect to cross the deductible line. For a family with annual expenditures of $55, for example, reimbursement would come only to $4, so careful record-keeping may not be justified. Second, the utilization response may be over-estimated. We have expressed some nervousness in chapter two about the very large 'demand elasticities' claimed, e.g., by Newhouse (1976); but it may be that in a deductible and coinsurance plan the estimated utilization increases which we believed conservative may still be too high. Thirdly, we may have underestimated the proportion of expenditures accounted for by low users, or overestimated non-users. If over the past decade the increases in prescription drug utilization have not been proportional across all user levels, but rather a result of more irregular users being drawn into the 'drug culture,' then our older data on distribution of expenditures would tend to overestimate the proportion of use accounted for by high users and hence to overestimate program costs. Finally our projections of relative *per capita* costs in Manitoba and Ontario may be in error.

Assessing the relative strengths of these effects, we note that of the discrepancy between $51.35 million and $73.6-83.7 million, the estimated utilization increase effect accounts for about one-third to one-half. Even if there were *no* utilization increase, our program estimates would be $66.9 million (including estimated administration). As for the possible non-claimants, we estimated above that the group of users with annual expense between $50 and $75 would number 50/7 per cent of the population, or 0.5/7 X 8.237) = 0.588 million people, with assumed annual expenses of $62.50 each. This group, therefore, would account for $36.75 million in prescription expenditure, or $38.05 million in total costs, about 56.88 per cent of total program costs. By contrast, in the Manitoba plan claims between $50 and $100 accounted for only 54.38 per cent of program costs (assuming annual expenses of $75 for each of 30,125 claims out of a total of 66,445). If one in four of this group of people with expenditures between $50 and $75 failed to make a claim, estimated program costs would thus be reduced by nearly ten million dollars.

A combination of sluggish utilization response and failure to claim may thus be sufficient to explain the discrepancy between Ontario estimates and Manitoba experience. Insofar as these effects do explain the difference, Manitoba cost program. As for the remaining two sources of error, of course faulty projections are faulty. As more recent data become available, one will be able to determine what has in fact happened to *per capita* prescription expenditures in Ontario and Manitoba. But the possiility that part of the discrepancy arises from a relative increase in prescription drug utilization among those who in earlier years were low- or non-users (perhaps, for example, due to use of contraceptive drugs) further reinforces the argument for a deductible rather than a universal program. The larger the share in total expenditure accounted for by frequent purchasers of relatively small amounts of drugs (i.e., the more evenly is drug expense spread over the population), the weaker is the argument for insurance on either risk-spreading or wealth-transfer grounds.

APPENDIX C

Retail pharmacy: some current price data

Chapter three has attempted to estimate the extent to which present retail prescription charges may be unnecessarily high due both to the over-utilization of highly-trained personnel in 'counting and pouring' and to the tendency of the community pharmacist to divide his/her time between pharmacy and general retail management and (apparently) to charge a significantly higher implicit price for the former. It has been argued partly on the basis of the theoretical structure of chapter six that because there is a professional component in retail pharmacy the profession has been able to act collectively to blunt competitive market forces which might otherwise reduce these excess cost components. Such excess costs appear to be of significant orders of magnitude, between 10-20 per cent of retail drug prices, and would add significantly to the expenditures necessary to finance any public prescription drug insurance plan. Moreover, it seems clear that by attenuating or removing such price incentives to consumers as now exist, a public pharmaceutical insurance plan would tend to exacerbate the excess cost problem. Hence it was argued that a more efficient retail drug delivery system requires either the consolidation of the dispensing function into the health team along the lines suggested by Torrance (1972) for the community health centres or the revitalization of competitive market forces within the context of some form of public insurance or prepayment system.

It may be argued, however, that the existing retail dispensing system already includes sufficient competitive forces that the objective of increased efficiency in dispensing will be achieved over time without significant public intervention to increase consumer awareness of and exposure to relative dispensing charges. One might, for example, point to the slow rise in population per pharmacy, the relatively static behaviour of the pharmacist/population ratio, and the growth in prescriptions dispensed per pharmacist, per pharmacy, and as a proportion of pharmacy sales, which have taken place in the past two decades and which are documented in the report of the Commission on Pharmaceutical Services (1971) and in subsequent statistical surveys of the C.Ph.A. and the Canada Health Manpower Inventory (1974). One might then be tempted to suggest that professional restrictions have served to impede but not to block the rationalizing effects of market forces, and that the development of significant inefficiencies has occurred because technological innovation in dispensing has taken place faster than the speed with which the delivery system could be rationalized to respond. In such a context, one might expect the problem to resolve itself if policy-makers are patient.

Such a view of the world might underlie and justify a partial pharmacare program, e.g., covering only the elderly, on the expectation that competitive forces operating in the rest of the market would be strong enough to constrain dispensing fees and prescription prices generally and to create incentives for increased dispensing efficiency. The British Columbia pharmacare plan (prior to 1977) was apparently designed on this expectation, embodying the specification that pharmacies would be reimbursed at their customary dispensing fee with the requirement that this fee be the same for insured and uninsured customers and that it not run more than a specified percentage above the average for a reference group of 'similar' pharmacies. Such a program would reduce, but not eliminate, the price sensitivity of a pharmacy's market since only the elderly would become price-insensitive and price discrimination between elderly and non-elderly would violate the condition of participation. Theoretically one would expect a short-run increase in prices in response to the new rightward shifted demand curve; but in the longer run slow-acting dynamic forces which were creating incentives for increased dispensing efficiency would continue to operate – and any pharmacy which found it more profitable to drop out of the general market and serve only the elderly at very high prices would be caught by the specific upper limit on charges.

Given this theoretical possibility, it is of interest to take a closer look at the data being generated by the BC pharmacare plan in order to observe whether any such competitive forces can be seen at work. Inferences drawn from these data and applied in other provinces such as Ontario are of course a bit shaky, but the computerized data base in BC is at present more accessible for this type of tabulation. If competitive forces are continuing to operate in the prescription drug market, one would expect to find pricing patterns such that more efficient modes of organization of retail dispensing are able to under-price less efficient modes, and thereby to expand their market share over time. Since greater efficiency has been identified as related to pharmacy size (economies of scale), degree of specialization of the pharmacist in the dispensing function, and form of organization of the pharmacy, we shall examine pricing patterns by scale and form of organization and control.

Tables C.4 and C.5 provide tabulations of certain basic data from four selected months (expanded to annual rates in Table C.4) bearing on the question of differences in efficiency by scale and form of organization. The data suffer from two major weaknesses, with respect to their representation of scale and of volume of services. The number of prescriptions dispensed refers only to pharmacare prescriptions, for patients aged 65 or over, and thus any volume comparison across pharmacies rests on the important and almost certainly invalid assumption that the proportion of prescriptions dispensed to pharmacare patients is roughly constant across pharmacies. Secondly, the number of pharmacists per pharmacy (provided by the Health Manpower Research Unit, University of British Columbia) is not adjusted to full-time equivalents and thus overstates the actual capacity of any pharmacy using part-time help.

This latter weakness is particularly unfortunate as it probably results in more severe overstatements of 'capacity' in relatively larger pharmacies, and correspondingly understates output per pharmacist. In a plot of output per pharmacist against pharmacy scale, such a bias would push observed points rightward and down, masking any scale economies. Ideally one would probably want to measure capacity by full-time-equivalent pharmacists, since such operating measures as total prescriptions, volume of prescription sales, or volume of total sales, are all subject to the well-known 'regression fallacy' problem which biases towards observing scale economies. Given the partial and biased nature of the data, Table C.4 should be taken as suggestive only.

What it suggests is that the number of prescriptions dispensed per pharmacist is relatively sensitive to form of management, but not to scale of operations. For all pharmacies, output per pharmacist tends to decline steadily as manpower increases (except for a jump at four pharmacists, and a single large chain dispensary outlet with nine). Department store outlets show a steady rise of 'productivity' with scale, but other types of pharmacies are generally irregular. The dominant form, community pharmacies, show a decline from one to three and then a sharp jump at four, suggesting that a shift from part- to full-time pharmacists may occur at this level, but for pharmacies belonging to large chains of four or more outlets the pattern is reversed.

On the whole, no clear pattern of scale effects emerges but it is impossible to say how much this is due to the FTE bias. If, for example, we were to assume that on average each pharmacist present after the first in any establishment were only two-thirds of a full-time equivalent, we would modify Table C.4 to indicate prescriptions dispensed in successive size categories of 3036, 3071, 3251, 3744, 2465, 2467, or moderate scale economies up to a peak productivity of three FTE pharmacists, one full-time and three part-time, dropping sharply thereafter. An even more extreme estimate that each pharmacist after the first works only half time, yields 3036, 3412, 3794, 4493, 3010, 3065, with substantial scale economies. Thus it is certainly possible that some such effects are masked. Moreover it should be noted that if pharmacare beneficiaries tend to patronize smaller, neighbourhood pharmacies, then the larger outlets may have a smaller proportion of pharmacare prescriptions and their relative productivity would be biased downward yet again.

If such effects exist, however, Table C.5, which is not subject to the same biases, provides no evidence of any resulting price effects. Average price per prescription does tend to fall a bit in the range 4-6 pharmacists (1-2 per cent) compared with 1-3, but it rises again thereafter. If there are masked increases in dispensing productivity with scale of operations, they are not passed through in price differentials to the patient.

The same appears very clear when one holds scale constant and looks at type of control. Dramatic variations in output per pharmacist occur by type of control, even in line one of each table where the FTE problem is absent. Chain dispensaries with a single pharmacist dispense *three times* the volume of prescriptions that a community pharmacist does, and chain franchise pharmacists dispense 40 per cent more. This provides a dramatic demonstration of the unreliability of pharmacist/population statistics and is very close numerically to the estimates in chapter three drawn from the literature of the relative increase in workload which could be achieved if pharmacists in general worked full time. This advantage drops off sharply with size, however, suggesting that dispensaries with more pharmacists employ the extra manpower only part-time (intentionally or not) and showing the difficulty of acquiring larger market shares. And Table C.5 shows another piece of the same picture – the high productivity chain dispensaries are also higher priced. Clearly they do not use price as a market-expanding strategy, and as a result the efficiency gains from specialization in the high margin, low overhead dispensing function are not passed on to the customer. Such 'gains' may of course not be realized, they may be dissipated in pharmacist idle time. Or they may be extracted by someone else, the Lilly Digest (1975) data suggest that US dispensaries have rental costs of 4.7 per cent of sales compared with a 2.5 per cent average for all pharmacies, even though their sales per square foot are twice as large ($207 compared with $100). This suggests an average rental per square foot of nearly four times as much for dispensaries as for general pharmacies – the medical arts buildings may be taking a share. But wherever the gains are going, there is clearly no price advantage to the consumer and thus no competitive pressure encouraging specialization or expansion of scale.

Or anything else. The relative price differences per prescription are remarkably small, from a maximum 5.7 per cent above average for department stores, 2.6 per cent above for chain dispensaries, to a low of 1.8 per cent below average for independent dispensaries. The price structure of the retail dispensing industry appears to be remarkably smooth, probably due to the development of professional fee dispensing as a device for promoting price parallelism. If there is little or no variation in prices from one type of pharmacy to another, the chance of any shift in industry structure taking place as a result of competitive pressures in the product market is remote. Of course, capital market pressures may lead to changes if, for example, chains can take advantage of scale economies without passing them on to the consumer. It will then be profitable for such chains to buy out independent pharmacies. But this form of expansion of market share by merger or purchase will not lead to lower prices, as chains will be at least as cognizant of their mutual interdependence as are independent community pharmacists. The consumer will benefit only if market share competition takes the form of price competition, not acquisition and merger.

In this context it is interesting that a recent Toronto survey of prescription drug prices reported in *Drug Merchandising* (1976) found no systematic tendency for chain pharmacies to charge lower prices on prescription drugs. The survey did, however, suggest that prices were lower in chains for self-medication items on which prices can be advertised and consumers can easily compare prices. Such findings are consistent with a general argument that the restriction of price-competitive behaviour raises the cost of price-searching for consumers to an unacceptable degree. As price-searching becomes less common, the potential market share gains to sellers from a low price strategy are correspondingly reduced. Under such circumstances one would not expect systematic prescription price differentials related to scale or form of ownership because no competitive advantage derives from such differentials.

Prescription price data are themselves subject to two major qualifications, however, in that a prescription is not a standard item. Comparison of prices across outlets may be biased by differences in type of prescription dispensed, or in size of average prescription. Fortunately, the BC data base permits one to correct for these biases because each prescription claim paid is identified by size (in terms of numbers of relevant units) and type of drug (by generic and brand name). From this information one can extract data on similar types of prescriptions, both total costs and costs per unit dispensed, such that comparisons can be made across pharmacies with respect to a single product.

For this purpose, fourteen specific brand names of drugs were selected and a comparison made of prescription prices and unit costs of these drugs across pharmacies of different size and type of control. In addition, thirteen generic categories were established and average total and unit prices of prescriptions compared over the same grid to check for the possibility that drug choice within generic-equivalent classes enters as a component of price strategy.

From Table C.6 it is clear that adjustment for prescription type, while adding a bit more information, does not change any of the general conclusions which one might reach from examining the average prescription prices. The percentage variation from highest to lowest is in general greater on the individual components, but a pattern emerges of pharmacies run by large chains, franchised or owned, and independent dispensaries, being very slightly lower in price per prescription than the all-pharmacy average while chain dispensaries, department stores and members of small chains are higher. The single community pharmacy, still the largest single category, is slightly above average in almost all generic classes, twelve of thirteen, but in only eight out of fourteen brand classes with two ties.

A direct averaging procedure in this context is not too meaningful; instead we have carried out a ranking of the seven different types of management in each of the generic and brand classes and have averaged the rank scores from highest (1) to lowest (7). These averaged ranks can then be compared with the rankings on all prescription averages, and on the dispensing fee, as follows shown in Table C.1.

It appears that the rankings of prescription prices by brand names and by generic names give patterns very similar to that for the unweighted average of all prescriptions. A discrepancy between brand name and generic class average ranks suggests a tendency to dispense less-costly prescriptions in a given class; thus department stores (e.g.) are relatively more costly on an average of prices of specific brands than on an average based on generic classes only. One cannot say *a priori* that this is due to cost reducing substitution by such pharmacies, or whether patients with generic prescriptions or price-conscious physicians are more likely to patronize department store pharmacies. Whatever the cause, department stores and large chain pharmacies seem to dispense lower-priced generic equivalents more frequently, and community pharmacies in single units or small chains tend to favour the higher priced end of the spectrum. Price per prescription is not well correlated with relative dispensing charges, however, which suggests an influence from ingredient cost and may reflect different prescription sizes, particularly in department stores.

These tables reinforce the conclusion that specialized dispensing yields no economies at least in terms of price reductions for the consumer. There are definite price patterns by mode of pharmacy control, with the impression from aggregate data being reinforced such that independent dispensaries, large chains and franchise chains are able to offer slightly lower prices while solo community pharmacies, small chains, department stores, and chain dispensaries are more

TABLE C.1

Rankings of prescription prices by pharmacy management class

	Average prescription price	Rank average from generic classes	Rank average of brand names	Average dispensing fee
Solo community	4	3.34	3.81	2
Franchise chain	5	5.20	5.33	4.5
Large chain	6	5.89	5.18	6.5
Independent dispensary	7	5.04	5.33	3
Chain dispensary	2	2.25	2.52	4.5
Department store	1	3.72	2.72	6.5
Small chain	3	2.56	3.10	1

NOTE: Highest = 1

costly. But the differences are *very* small on average, and while spreads on particular brands or generic drugs may be quite large (e.g., about 20 per cent between highest and lowest class of outlet on both class of drugs G1 and brand name B1) the differences are not consistent from one drug to another. Price dispersion is small and irregular, which makes consumer searching a highly uncertain process with limited benefits. Moreover it must be kept in mind that price per prescription is only one dimension of the 'market' offering, and conceivably community pharmacies offer a mix of convenience in location and other non-price features which balance these differences.

Table C.7 duplicates C.6 but reports unit price rather than total prescription price; it thus serves as an adjustment for differing prescription size. The relative costliness of department store pharmacies is sharply reduced in this tabulation, indicating that on average such pharmacies fill larger prescriptions. Such a comparison could not be made at the aggregate level, as no natural unit exists for the 'average' prescription. Going through the same procedure of ranking each type of pharmacy management on the unit price of each drug brand or generic class and averaging the ranks, we derive Table C.2.

The ranking of department stores has dropped sharply, while independent dispensers have moved up and chain dispensers are even more clearly top. Chain dispensers charged highest average unit prices for nine of thirteen types of

TABLE C.2

Rankings of unit prices of drugs by pharmacy management class

	Unit price rank average generics	Unit price rank average brand names	Average prescription price	Average dispensing fee
Solo community	2.81	3.15	4	2
Franchise chain	4.73	4.93	5	4.5
Large chain	5.88	6.43	6	6.5
Independent dispensary	3.77	2.61	7	3
Chain dispensary	1.96	2.07	2	4.5
Department store	5.38	5.79	1	6.5
Small chain	3.46	3.93	3	1

NOTE: Highest = 1

generic drugs, plus one tie for first, and seven out of fourteen brand names, and were in the top three classes in all but four out of twenty-seven types of drugs. The unit price ranking seems to conform more closely to the dispensing fee ranking, showing large chain and department stores least expensive, and dispensers, community pharmacies, and small chains at the top. The higher-priced pharmacies thus also seem to dispense smaller amounts on a given prescription, which would lead the patient to underestimate the relative costliness of their dispensing services unless he/she could compute and compare unit charges.

A finer data breakdown also reveals some price differentials by size of pharmacy (measured in total numbers of full and part-time pharmacists). Pharmacies with one or two pharmacists are consistently a bit higher in price both on a per prescription and per unit of drug basis. Ranking each pharmacy in the one to five pharmacist group on each drug class, and averaging the ranks, we observe the results shown in Table C.3.

This pattern indicates that prices are indeed higher on average in smaller pharmacies; what is interesting is that Table C.4 does not show any corresponding disadvantage in dispensing productivity. Moreover the aggregate price

TABLE C.3

Average rankings of prescription prices by pharmacy size

Number of pharmacists	Unit price generics	Unit price brands	Prescription price generics	Prescription price brands
1	2.00	1.93	2.42	2.71
2	1.77	1.96	1.88	2.54
3	4.23	4.43	3.27	3.18
4	3.54	3.11	3.54	3.50
5	3.46	3.57	3.73	3.07

NOTE: Highest = 1

statistics of Table C.5 show three-pharmacist pharmacies ranking relatively high, suggesting that they must be dispensing a more expensive mix of prescriptions. The differentials appear more pronounced, also, on unit prices, suggesting that smaller, higher-priced pharmacies also dispense smaller prescriptions; but one cannot tell *a priori* whether this is a supply-side or a demand-side phenomenon, or indeed a result of prescriber behaviour.

On the basis of these data, it seems justifiable to conclude that there exists some degree of price differentiation in the pharmaceutical dispensing market, at least in BC, despite the restrictions imposed by the professional structure of pharmacy. There appear to be detectable scale effects as larger pharmacies charge lower per unit prices on average, and there appear to be distinct price strategies according to the differing management structures of pharmacies, with dispensaries and community pharmacies pricing high and large chains and department stores low.

Before proceeding from these observations to conclude that the structure of the pharmaceutical dispensing industry already embodies competitive forces leading in the direction of improved efficiency, however, three points deserve emphasis.

First, the price structure is far from clear. The relative price effects observed appear to be systematic, but they are very weak and vary from drug to drug. Since most patients buy few, and few kinds, of drugs, the process of developing relative price information for a consumer in the environment described by these tabulations would be very costly and uncertain, relative to any potential gains. Moreover insofar as observed differentials above are based on unit prices rather than prescription prices, they may not even exist in the self-paying market. Pharmacare regulations require that pharmacies not discriminate in ingredient charges or dispensing fees between insured and uninsured patients. But since prescriptions consist of a fixed and a variable fee, such regulations will not prevent differentiation of unit prices by dispensing smaller quantities for the insured. Thus pharmacare data on unit cost differentials may overstate the actual differentiation in the private market. But even if they do not, few patients are likely to be able to work out relative price differentials on a drug-standardized, unit cost basis. The most energetic searching is likely to consist of taking a prescription to two or three stores – a very high cost search method which as observed will *not* generate information which can reliably be generalized to the next prescription.

Secondly, the price differentials which do exist do not seem to correlate with the (admittedly imperfect) data on dispensing productivity. Specialist dispensers with high rates of prescriptions per pharmacist charge the highest prices; department stores and large chains with lower throughput per pharmacist charge lower prices. This is of course a very suspicious result; it is highly likely that in fact large chains and department stores simply fill a lower proportion of pharmacare prescriptions. Quite logically, the insured will respond to convenience rather than price differentials. But even comparing community pharmacies (solo or small chain) with dispensaries, we observe that full-time, high productivity dispensers charge higher prices than community pharmacists who are part-time retailers. Moreover, prices and productivity per pharmacist both seem to fall with scale. As stressed, the partial nature of both prescription and pharmacist data in Table C.4 makes it easy to think up alternative explanations for this observation. Still it would have been comforting to find *some* evidence of dispensing efficiency related to price. As it is, the possibility exists that larger pharmacies, chains or department stores, are deriving savings from large-scale ingredient acquisition and management rather than more efficient dispensing *per se*. But with such data, it is only a possibility.

Finally it is of interest to consider what changes are occurring over time in the structure of relative prices. Table C.10 displays changes across the months studied, from August 1975 to April 1976, in prescription charges and dispensing fees paid by pharmacare. This tabulation suggests a convergence in pricing patterns over the period, the variation in dispensing fees has converged toward the mean for all classes of pharmacy management. It is clear that, perhaps due to pharmacare, perhaps to the spread of the concept of professional fee dispensing, price parallelism is increasing. The trend is less clear for prescription prices; only five of seven forms of pharmacy are converging. But recalling the fact that department stores were identified above as dispensers of relatively large prescriptions, their jump in prescription prices probably represents convergence toward mean unit prices as their dispensing fees have moved up from 13 per cent below mean to 0.4 per cent above. These data certainly suggest that the degree of price

TABLE C.4

Pharmacare prescriptions dispensed per pharmacist, by pharmacy size and type of control (BC, annual rate)

	Type of control							
Pharmacy size (no. of Pharmacists)	Solo Community	Franchise chain	Large chain	Independent Dispensary	Chain Dispensary	Department Store	Small chain	All
1	3303	4602	1908	3885	10,500	–	2277	3036
2	2778	2319	2382	4710	7761	1062	2250	2559
3	2658	2454	2820	3027	4644	1524	2283	2529
4	3909	3414	909	4674	–	1974	1401	2808
5	2208	1248	–	4242	–	2343	–	1806
6	–	–	801	–	–	2778	–	1788
7	–	–	–	–	–	–	2547	1275
9	–	–	–	–	5703	–	–	5703
12	–	–	–	–	–	2265	–	1233
13	–	–	–	–	–	2241	–	1218
	Prescriptions per pharmacy							
Unknown	1515	2613	855	5391	–	1329	–	1137
All	5559	6606	4938	7512	15,018	7353	5340	5196

SOURCE: BC pharmacare tapes for Aug. and Nov. 1974, Feb. and April 1975, pooled and multiplied by three to estimate twelve months.

dispersion has diminished in the prescription drug market during the early Pharmacare experience, and the implications for the effectiveness of competitive forces in the non-Pharmacare market as a control mechanism are not encouraging.

TABLE C.5

Average price per prescription, by size of pharmacy and type of control (BC)

	Type of control							
Pharmacy size (no. of Pharmacists)	Solo Community	Franchise chain	Large chain	Independent Dispensary	Chain Dispensary	Department Store	Small chain	All
1	5.00	5.00	5.10	5.10	5.30	–	4.80	5.06
2	5.10	5.10	5.00	5.10	5.00	5.30	5.10	5.06
3	5.10	5.10	5.00	4.80	5.60	5.60	5.10	5.09
4	5.10	5.00	5.30	5.10	–	5.30	4.90	5.03
5	5.30	4.90	–	4.80	–	5.40	–	4.97
6	–	–	5.40	–	–	4.90	–	5.02
7	–	–	–	–	–	–	5.30	5.34
9	–	–	–	–	5.20	–	–	5.19
12	–	–	–	–	–	5.30	–	5.22
13	–	–	–	–	–	5.60	–	5.47
Unknown	5.10	4.80	5.00	4.90	–	5.10	4.30	4.92
All	5.08	5.04	5.03	4.98	5.20	5.36	5.09	5.07

SOURCE: See Table C.4.

TABLE C.6

Average price per prescription for thirteen generic drug classes and fourteen brand name classes, and average dispensing fee by type of control of pharmacy

	Type of control							
	All	Solo community	Franchise chain	Large chain	Independent dispensary	Chain dispensary	Department store	Small chain
All	5.07	5.08	5.04	5.03	4.98	5.20	5.36	5.09
G1	3.21	3.30	3.17	2.91	3.12	3.65	3.42	3.32
G2	5.18	5.27	5.02	5.25	5.25	5.43	5.21	5.01
G3	3.15	3.24	3.11	2.96	3.14	3.16	3.05	3.19
G4	4.45	4.49	4.32	4.36	4.26	4.98	4.69	4.53
G5	4.57	4.61	4.51	4.44	4.78	4.46	4.39	4.91
G6	3.43	3.48	3.36	3.27	3.43	3.70	3.24	3.77
G7	3.46	3.47	3.40	3.28	3.32	3.74	3.88	3.76
G8	3.43	3.47	3.35	3.40	3.41	3.52	3.57	3.57
G9	4.12	4.16	4.15	4.09	4.02	4.29	3 94	4.16
G10	4.43	4.44	4.34	4.25	4.45	4.48	4.94	4.46
G11	3.74	3.72	3.70	3.79	3.47	3.84	4.28	3.93
G12	6.17	6.30	6.15	5.59	5.91	6.63	7.19	6.09
G13	3.02	3.11	3.09	2.61	3.06	3.17	2.51	3.32
Dispensing fee	2.26	2.29	2.26	2.18	2.28	2.26	2.18	2.33
B1	3.01	3.08	3.01	2.73	3.07	3.53	2.89	3.02
B2	4.75	4.80	4.61	4.73	4.75	5.11	4.78	4.77
B3	4.13	4.16	4.16	4.09	4.05	4.29	3.94	4.17
B4	3.40	3.42	3.32	3.36	3.34	3.54	3.56	3.58
B5	3.60	3.76	3.28	3.58	3.68	3.81	3.84	3.77
B6	7.43	7.39	7.36	7.68	7.44	7.61	7.89	7.11
B7	3.10	3.14	3.02	3.04	3.11	3.26	3.20	3.21
B8	5.21	5.16	5.17	5.13	5.16	5.42	5.61	5.44
B9	4.03	4.03	3.92	3.95	3.98	4.13	4.23	4.18
B10	4.15	4.15	4.12	4.25	3.93	4.00	4.45	4.23
B11	3.07	3.15	3.00	3.01	2.95	3.21	3.13	3.25
B12	4.43	4.35	4.42	4.58	4.22	4.65	4.78	4.37
B13	8.37	8.21	8.78	8.48	8.02	10.13	10.01	8.51
B14	3.74	3.81	3.73	3.59	3.80	3.61	3.72	3.73

TABLE C.7

Average price per unit of prescribed medication, by thirteen generic and fourteen brand name drug categories (BC)

	Type of control							
	All	Solo community	Franchise chain	Large chain	Independent dispensary	Chain dispensary	Department store	Small chain
G1	0.2279	0.2409	0.2153	0.2066	0.2297	0.2848	0.2264	0.2212
G2	0.3042	0.3073	0.3024	0.3132	0.2795	0.3300	0.3124	0.3103
G3	0.0923	0.0958	0.0924	0.0844	0.0908	0.1005	0.0872	0.0925
G4	0.1407	0.1441	0.1333	0.1351	0.1386	0.1673	0.1402	0.1475
G5	0.0324	0.0329	0.0348	0.0298	0.0341	0.0281	0.0277	0.0323
G6	0.0447	0.0471	0.0446	0.0391	0.0468	0.0479	0.0386	0.0475
G7	0.0671	0.0677	0.0689	0.0635	0.0562	0.0771	0.0653	0.0695
G8	0.0645	0.0688	0.0625	0.0585	0.0705	0.0680	0.0596	0.0602
G9	0.0443	0.0467	0.0428	0.0402	0.0467	0.0473	0.0363	0.0470
G10	0.0447	0.0462	0.0434	0.0434	0.0480	0.0480	0.0426	0.0433
G11	0.0710	0.0733	0.0684	0.0641	0.0727	0.0843	0.0729	0.0694
G12	0.0589	0.0627	0.0577	0.0480	0.0626	0.0558	0.0618	0.0619
G13	0.0549	0.0579	0.0541	0.0445	0.0547	0.0685	0.0414	0.0630
B1	0.0867	0.0892	0.0903	0.0752	0.0892	0.0874	0.0811	0.0877
B2	0.1504	0.1543	0.1434	0.1433	0.1538	0.1724	0.1443	0.1535
B3	0.0443	0.0466	0.0428	0.0402	0.0468	0.0472	0.0360	0.0469
B4	0.0505	0.0541	0.0480	0.0461	0.0553	0.0547	0.0462	0.0464
B5	0.0755	0.0802	0.0707	0.0719	0.0760	0.0818	0.0724	0.0769
B6	0.1009	0.1024	0.1003	0.1002	0.1009	0.1018	0.0987	0.0970
B7	0.0773	0.0834	0.0746	0.0661	0.0853	0.0796	0.0728	0.0788
B8	0.0907	0.0929	0.0883	0.0872	0.0927	0.0961	0.0895	0.0892
B9	0.0388	0.0406	0.0374	0.0377	0.0402	0.0422	0.0351	0.0379
B10	0.0789	0.0829	0.0741	0.0745	0.0864	0.0962	0.0754	0.0753
B11	0.0853	0.0902	0.0805	0.0750	0.0959	0.0859	0.0753	0.0850
B12	0.0409	0.0442	0.0394	0.0372	0.0407	0.0430	0.0373	0.0426
B13	0.0816	0.0854	0.0842	0.0765	0.0856	0.0805	0.0780	0.0843
B14	0.0685	0.0684	0.0673	0.0644	0.0646	0.0840	0.0619	0.0736

TABLE C.8

Average price per prescription dispensed, by size of pharmacy, for thirteen generic and fourteen brand name drug categories (BC)

	Number of pharmacists per pharmacy					
	1	2	3	4	5	All
G1	3.34	3.21	3.17	3.17	3.26	3.21
G2	5.33	5.28	4.97	5.26	5.23	5.18
G3	3.12	3.20	3.11	3.18	3.04	3.15
G4	4.48	4.50	4.35	4.41	4.50	4.45
G5	4.57	4.73	4.52	4.43	4.40	4.57
G6	3.40	3.51	3.37	3.40	3.31	3.43
G7	3.36	3.48	3.42	3.53	3.44	3.46
G8	3.49	3.45	3.41	3.40	3.33	3.43
G9	4.18	4.21	4.14	4.03	3.70	4.12
G10	4.49	4.43	4.38	4.32	4.52	4.43
G11	3.62	3.73	3.78	3.70	3.60	3.74
G12	6.22	5.97	6.31	5.95	6.18	6.17
G13	2.99	3.15	3.04	2.92	2.76	3.02
B1	3.03	3.04	2.96	2.99	3.48	3.01
B2	4.77	4.79	4.67	4.75	4.81	4.75
B3	4.19	4.21	4.15	4.04	3.81	4.13
B4	3.45	3.42	3.37	3.38	3.27	3.40
B5	3.70	3.67	3.49	3.58	3.41	3.60
B6	7.54	7.35	7.55	7.29	7.56	7.43
B7	3.17	3.10	3.05	3.12	2.93	3.10
B8	5.20	5.20	5.21	5.25	5.12	5.21
B9	4.02	4.04	4.00	3.99	4.06	4.03
B10	4.06	4.11	4.19	4.15	4.21	4.15
B11	3.10	3.10	3.06	3.06	2.86	3.07
B12	4.32	4.34	4.53	4.40	4.89	4.43
B13	8.69	8.07	9.01	8.07	6.17	8.37
B14	3.62	3.90	3.76	3.44	3.87	3.74

TABLE C.9

Average price per unit of prescribed medication, by size of pharmacy, for thirteen generic and fourteen brand name drug categories (BC)

	Price per unit by size					
	1	2	3	4	5	All
G1	0.2488	0.2274	0.2209	0.2251	0.2243	0.2279
G2	0.2992	0.3105	0.2804	0.2988	0.3093	0.3042
G3	0.0903	0.0957	0.0921	0.0910	0.0860	0.0923
G4	0.1488	0.1440	0.1358	0.1348	0.1429	0.1407
G5	0.0336	0.0331	0.0312	0.0313	0.0361	0.0324
G6	0.0453	0.0463	0.0434	0.0452	0.0444	0.0447
G7	0.0651	0.0686	0.0662	0.0672	0.0626	0.0671
G8	0.0685	0.0661	0.0613	0.0654	0.0635	0.0645
G9	0.0483	0.0454	0.0427	0.0432	0.0424	0.0443
G10	0.0480	0.0461	0.0440	0.0421	0.0450	0.0447
G11	0.0708	0.0739	0.0669	0.0711	0.0755	0.0710
G12	0.0613	0.0591	0.0570	0.0588	0.0589	0.0589
G13	0.0598	0.0597	0.0516	0.0500	0.0489	0.0549
B1	0.0857	0.0901	0.0861	0.0852	0.0809	0.0867
B2	0.1570	0.1531	0.1451	0.1452	0.1587	0.1504
B3	0.0481	0.0453	0.0426	0.0430	0.0429	0.0443
B4	0.0537	0.0517	0.0477	0.0509	0.0490	0.0505
B5	0.0816	0.0763	0.0722	0.0773	0.0692	0.0755
B6	0.1012	0.1017	0.0997	0.1017	0.1014	0.1009
B7	0.0816	0.0792	0.0752	0.0758	0.0753	0.0773
B8	0.0928	0.0915	0.0887	0.0900	0.0968	0.0907
B9	0.0412	0.0398	0.0383	0.0379	0.0376	0.0388
B10	0.0817	0.0825	0.0749	0.0773	0.0818	0.0789
B11	0.0925	0.0896	0.0800	0.0838	0.0819	0.0853
B12	0.0423	0.0429	0.0387	0.0425	0.0367	0.0409
B13	0.0831	0.0851	0.0809	0.0856	0.0587	0.0816
B14	0.0748	0.0682	0.0657	0.0647	0.0681	0.0685

TABLE C.10

Changes in pharmacare prescription charges and dispensing fees, by type of pharmacy (BC, August 1974-April 1975)

	Type of pharmacy							
	Solo Community	Franchise chain	Large chain	Independent Dispensary	Chain Dispensary	Department store	Small chain	All
August 1974								
Prescription price ($)	4.77	4.66	4.65	4.69	4.91	4.95	4.79	4.75
As percentage of average	+0.4	−1.9	−2.1	−1.3	+3.4	+4.2	+0.8	–
Dispensing fee ($)	2.13	2.00	1.98	2.10	2.19	1.80	2.18	2.07
As percentage of average	+2.9	−3.4	−4.3	+1.4	+5.8	−13.0	+5.3	–
April 1975								
Prescription price ($)	5.39	5.38	5.39	5.24	5.55	5.73	5.37	5.38
As percentage of average	+0.2	+0.0	+0.2	−2.4	+3.2	+6.5	−0.2	–
Dispensing fee ($)	2.44	2.45	2.35	2.43	2.35	2.43	2.47	2.42
As percentage of average	+0.8	+1.2	−2.9	+0.4	−2.9	+0.4	+2.1	–

APPENDIX D

Dental care utilization and dental health

Chapter four has stressed heavily the need for increases in levels of dental care utilization in order to improve the dental health status of the population of Ontario. Since the causal relations between health care generally and health status are not always precise, and since the provision of unnecessary and cosmetic services has generated concern in dentistry as elsewhere in health care, it is important that the meaning of ‘utilization’ in this context be clearly specified.

Utilization rates of dental services can be unambiguously defined as the proportion of a defined population with one or more dental visits in a given time period, usually a calendar year. The visit might be to a dental office, or a school or public clinic, and would usually but not necessarily involve contact with a dentist. Such a visit would be for diagnostic and/or therapeutic purposes; we would not include contact with a dental auxiliary in a classroom setting in this definition. It does not follow, from this definition, that each person thus contacting the dental care system is raised to a condition of optimal dental health as a result. A patient might refuse any treatment subsequent to an initial visit, or might agree to undergo all necessary future treatment required to attain ‘oral health’; the measurement of utilization rates would not distinguish these two situations. Ideally one might like to have data on utilization linked with oral health status, perhaps dividing the population into regular, occasional, emergency, and never users, as Lewis and Brown (1973) have done. They make clear, however, that this distinction is based on guesswork and cannot really be sustained from current data sources. It may be more relevant to public dental health objectives; but presently such measurements are not available.

Because utilization rates are usually defined over calendar years, they can mask a very important distinction in utilization patterns. A 50 per cent rate could mean that half of the population sees a dentist every year, or even twice a year, and the other half never does. Or it could mean that everyone in the population sees a dentist every two years. Given the incremental nature of dental disease, one would expect the average dental health status of the population to be much better in the second case. In the first situation, one could quite easily sustain the argument that an increase in utilization would be necessary in order to improve dental health status – unless the never users become users their teeth will continue to deteriorate. On the other hand, advocacy of increased utilization in the second case would have to be based on some judgment that the 'optimal' frequency of dental care required visits more often than every two years. Definition of such optima is much more difficult – obviously minimization of the *prevalence* of dental disease would require continuous monitoring to catch each point of decay, each accumulation of plaque, at the moment of its appearance. Since that is obviously impractical, the question of how frequent is optimal becomes a judgmental one, involving balancing of costs and benefits, a question, which as Lewis (1974) has pointed out has been more characterized by authoritative assertion ('See your dentist twice a year') than assessment of evidence.

In stressing as a criterion of a 'good' public dental plan its capacity to increase dental care utilization rates, we are therefore accepting current patterns of relatively low utilization rates as indicating a population split into 'users' and 'non-users' rather than a pattern of regular use less frequent than once per year. The strong correlation of utilization rates with socio-economic class, their geographic pattern, and their association with dental care availability and (where measured) dental health status seem to bear out this interpretation. The findings of the 'affluent communities' (Canada, Department of National Health and Welfare, 1971-4) studies referred to earlier, that patients under continuing care do in fact average somewhat over one visit per year, also suggest that low average utilization rates arise from sub-populations with distinct behaviour patterns of use and non-use. It follows that any public program intended to improve dental health status must be judged on its effectiveness in converting non-users to users; the encouragement of additional service use by current users will by comparison have (at best) relatively small benefits.

Such an emphasis also embodies implicit judgements about the effectiveness of alternatives to dental care as ways of promoting dental health. We have already pointed out that fluoridation of community water supplies is much more effective as a method of lowering the *incidence* of dental disease than any number of dental visits. Various forms of home care programs, by contrast, have yet to prove effective in part due to the difficulties of compliance. Nor is there any substitute for dental care to control disease *prevalence*, once decay or periodontal disease has set in. A world of the future, with anti-caries vaccines and plaque-dissolving mouthwashes, may well be one in which optimal visit rates are less than annual; if they fell to biennial then the optimal utilization rate measured for a population would indeed be 50 per cent. But it would still be necessary to ensure that the biennial rate approached 100 per cent!

Of course the optimal utilization rate for generally 'dentally fit' adults who are past the age of high caries incidence is probably less than 100 per cent at present; the benefits from annual dental visits are not at all clear. And one might well argue that an optimal system, even given present technology, would be one with measured utilization rates significantly below 100 per cent. Such an optimum would be very different from that provided by the present private-practice, fee-for-service system, however, even if utilization rates were similar, because it would provide visits significantly *less* frequently than at present to the relatively affluent regular users of dental care and would replace them with patients drawn from the present non-users. The dilemma of private practice as currently organized, with or without public insurance, is that it has no method of outreach – one cannot provide care to people who do not come. But the suggestion that 100 per cent (annual) utilization is an unrealistic and unnecessarily high criterion for 'optimal' care certainly raises very interesting questions about the ethics, as well as the economic efficiency, of such 'practice builders' as the six-monthly recall. The present system has its primary capacity for service expansion among the part of the population which needs it least.

Bibliography

American Dental Association, Bureau of Economic Research and Statistics (1973) 'Use of the American Dental Association Dental Health Care Plan during 1969, 1970, 1971, and 1972.' *Journal of the American Dental Association* 87, no. 9

– (1976) 'Productivity analysis.' Memorandum 193/76 (mimeo.) (Chicago: American Dental Association)

Andersen, R. and O. Anderson (1967) *A Decade of Health Services* (Chicago: University of Chicago Press)

Andersen, R. *et al.* (Oct. 1973) *Expenditures for Personal Health Services: National Trends and Variations 1953-1970* (Washington, DC: US Dept. of Health, Education, and Welfare)

Andreopoulos, S., ed. (1975) *National Health Insurance: Can We Learn From Canada*? (New York: John Wiley)

Angilley, A. (1973) 'Returns to scale in the ethical pharmaceutical industry.' *Journal of Industrial Economics* 22, no. 2

Archibald, G. (1964) 'Profit-maximizing and non-price competition.' *Economica* 31, no. 121

– (1965) 'The qualitative content of maximizing models.' *Journal of Political Economy* 73, no. 1

Arrow, K. (1963) 'Uncertainty and the welfare economics of medical care.' *American Economic Review* 53, no. 5

Avnet, H. and M. Nikias (1967) *Insured Dental Care* (New York: Group Health Dental Insurance Inc.)

Bachynsky, J. (Feb. 1972) *Pharmaceutical Services*. Paper prepared for the

Community Health Centre Project (Hastings Project), and published by the Canadian Public Health Association, Ottawa

Baron, D.P. (1970) 'Price uncertainty, utility, and industry equilibrium in pure competition.' *International Economic Review* 11, no. 3

Becker, M. *et al.* (1972) 'Correlates of physicians' prescribing behaviour.' *Inquiry* 9, no. 3

Benham, L. (1972) 'The effect of advertising on the price of eyeglasses.' *Journal of Law and Economics* 15, no. 2

– and A. Benham (1975) 'Regulating through the professions: a perspective on information control.' *Journal of Law and Economics* 18, no. 2

Blair, R. *et al.* (1975) 'Economies of scale in the administration of health insurance.' *Review of Economics and Statistics* 57, no. 2

Brewster, Agnes *et al.* (1963) 'Experience with a prepaid drug benefit.' *Journal of Health and Human Behaviour* 4, no. 1

British Columbia, Department of Labour (1975) 'Dental plans – the BC experience.' *Labour Research Bulletin* 3, no. 6

British Columbia (Dec. 1974 [1975]) *Report of the Children's Dental Health Research Project.* Report prepared for the Department of Health and the College of Dental Surgeons of BC (Victoria: Queen's Printer for BC)

British Columbia, Professional Pharmacists' Society (1973) *Product Selection Survey* (mimeo.). Two memoranda to survey participants and to Senate and Council. (Vancouver, BC)

Cady, John F. (1975) *Drugs on the Market* (Lexington, Mass.: D.C. Heath)

Cameron, N. (1973) 'Incentives and labour supply in co-operative enterprises.' *Canadian Journal of Economics* 6, no. 1

Canada (1964) *Report of the Royal Commission on Health Services* (Hall Commission) (Ottawa: Queen's Printer)

Canada, Department of Consumer and Corporate Affairs, Director of Investigation and Research (1975) *Material Collected for Submission to the Restrictive Trade Practices Commission ... relating to the Production, Supply, Distribution, and Sale of Ophthalmic Goods in Canada* (Ottawa: The Department of Consumer and Corporate Affairs)

Canada, Department of Consumer and Corporate Affairs, Bureau of Competition Policy (April 1976) *Stage 1 Competition Policy: Background Papers* (Ottawa: Department of Consumer and Corporate Affairs)

Canada, Department of National Health and Welfare (May 1970) *Report of Drug Expenditure Survey 1967.* Research and Statistics memo (mimeo.). (Ottawa: Health Research Division, Research and Statistics Directorate)

– (September 1970) *Earnings of Dentists in Canada 1958-68.* Health care series no. 26 (Ottawa: Research and Statistics Directorate)

- (1971) *Demand for Dental Services in Affluent Communities: Ontario* (Ottawa: Dental Health Division)
- (1974a) *Demand for Dental Services in Affluent Communities: Alberta* (Ottawa: Health Programs Branch)
- *Demand for Dental Services in Affluent Communities: British Columbia* (Ottawa: Health Programs Branch)
- (1974c) *Demand for Dental Services in Affluent Communities: Manitoba* (Ottawa: Health Programs Branch)
- (1975) *Health Manpower Inventory 1974* (Ottawa: Health Manpower Directorate)
- (April 1975) *National Health Expenditures in Canada, 1960-73* (Ottawa: Health Programs Branch, Health Economics and Statistics Division)
- Annual *Earnings of Physicians in Canada* (Ottawa: Health Programs Branch, Health Economics and Statistics Directorate) (Issued annually in Health Care Series, several issues used)

Canada, Department of National Revenue (1977) 'Employees' fringe benefits – Interpretation Bulletin No. IT-71R.' (Ottawa, 18 April)

Canada, House of Commons (1967) *Second (Final) Report of the Special Committee of the House of Commons on Drug Costs and Prices* (Harley Committee) (Ottawa: Queen's Printer)

Canada, Parliament (1976) *Combines Investigation Act.* RS, c.314, s.1 (office consolidation) (Ottawa: Queen's Printer)

Canada, Statistics Canada (1976) *Canadian Statistical Review* (March and June issues used) (Ottawa: Queen's Printer)

Canadian Dental Association (1968) *Survey of Dental Practice 1968* (Toronto: Canadian Dental Association)

- (1976) 'Association news.' *Canadian Dental Association Journal* 42, no. 6

Canadian Pharmaceutical Association (1973) '31st annual survey of community pharmacy.' *Canadian Pharmaceutical Journal* 106, no. 8 (also referenced as Fuller, 1973)

Chadwick, B.M. *et. al.* (Feb. 1975) 'Statement of the staff of the Federal Trade Commission concerning HEW's maximum allowable cost proposal' (mimeo.) (Washington: Federal Trade Commission)

Chaiton, A. *et al.* (1976) 'Patterns of medical drug use – a community focus.' *Canadian Medical Association Journal* 114, no. 1, 10 Jan.

Chiles, V.K. (1975) 'Fee per patient – a new method of pharmacist remuneration.' *Canadian Pharmaceutical Journal* 108, no. 9

Coase, R. (1937) 'The nature of the firm.' *Economica* n.s., 4, no. 15

Comanor, W.S. (1967) 'Market structure, product differentiation, and industrial research.' *Quarterly Journal of Economics* 81, no. 4

Commission on Pharmaceutical Services (1971) *Pharmacy in a New Age* (Toronto: Canadian Pharmaceutical Association)

Contandriopoulos, A.P. and J. Lance (1976) *Un Modèle de Prévision de la Main d'Oeuvre Médicale* (mimeo.) Final report of NHG project 605-21-48 (Montreal: McGill University)

Desjardins, A. and D.W. Lewis (Oct. 1975) *Historical Review of the Ontario Dental Association Fee Guide Prices* (mimeo.) (Toronto: Dental Health Care Services and Epidemiology Research Unit, University of Toronto)

Doherty, N. and I. Hussain (1975) 'Costs of providing dental services for children in public and private practices.' *Health Services Research* 10, no. 3

Drug Merchandising (1976) 'Newspaper Rx survey finds chains don't always offer the lowest prices.' 57, no. 3

Drug Topics (1976) 'Rx ads boost sales, says Courtesy.' (Chain news) 1 Oct. 1976

Dunning, J.M. (1968) 'A word of warning in incremental dental care.' *New York Journal of Dentistry* 38, no. 2

Eisner, R., and R.H. Strotz (1961), 'Flight insurance and the theory of choice.' *Journal of Political Economy* 69, no. 4

Ellis, R.L. (Nov. 1970) 'A study and appraisal of developments in voluntary dental prepayment and insurance plans in North America.' Unpublished MSc. thesis (Toronto: School of Hygiene, University of Toronto)

Ellis, R.L. *et al.* (n.d. 1975) *Team Approach to Delivery of Dental Care in a Private Office Setting.* Final report, Ontario Dental Association Demonstration Project. Toronto

Evans, R. (1972) *Price Formation in the Market for Physician Services in Canada, 1957-1969.* A study for the Prices and Incomes Commission (Ottawa: Queen's Printer)

– (1975a) 'Beyond the medical marketplace: expenditure, utilization, and pricing of insured health care in Canada.' In Andreopoulos (1975)

– (1975b) 'Paying the dentist, how, to whom, and for what?' (mimeo.) (Toronto: University of Toronto Dental Health Care Services Research Unit)

– (1976a) 'Does Canada have too many doctors? Why nobody loves an immigrant physician' *Canadian Public Policy* 2, no. 2

– (1976b) 'Modelling the objectives of the physician.' In R. Fraser, ed., *Health Economics Symposium: Proceedings of the First Canadian Conference* (Kingston, Ont.: Queens University Industrial Relations Centre)

Feldstein, M. (1970) 'The rising price of physicians' services.' *Review of Economics and Statistics* 52, no. 2

– (1973a) 'The medical economy.' *Scientific American* 229, no. 3

– (1973b) 'The welfare loss of excess health insurance.' *Journal of Political Economy* 81, no. 2, part 1

Feldstein, M. and E. Allison (April 1972) 'Tax subsidies of private health insurance: distribution, revenue loss and effects.' Discussion paper no. 237 (mimeo.) (Cambridge, Mass.: Harvard Institute of Economic Research)

Feldstein, M. and B. Friedman (1974) 'Tax subsidies: the rational demand for insurance and the health care crisis.' Discussion paper 382 (Cambridge, Mass.: Harvard Institute of Economic Research)

Feldstein, P. (1973) *Financing Dental Care: An Economic Analysis* (Lexington, Mass.: D.C. Heath)

– (1974) 'A preliminary evaluation of federal dental manpower subsidy programs.' *Inquiry* 11, no. 3

– and C. Roehrig (Nov. 1975) *An Econometric Model of the Dental Sector* (mimeo.) A report prepared by Policy Analysis, Inc., Boston, Mass.

Firestone, J. (1970) *Trends in Prescription Drug Prices* (Washington, DC: American Enterprise Institute)

Fortune (1976) See Robertson (1976)

Frankel, J. and J. Boffa (1974) *Prepaid Dental Care Technical Assistance Manual* (Boston: Jerold Enterprises Inc.)

Friedman, M. and L.J. Savage (1948), 'The utility analysis of choices involving risk,' *Journal of Political Economy* 55, no. 4

Fuchs, V. (1974) *Who Shall Live? Health, Economics, and Social Choice* (New York: Basic Books)

– and M. Kramer (Dec. 1972) *Determinants of Expenditures for Physicians' Services in the United States 1948-68.* National Center for Health Services Research and Development, and National Bureau of Economic Research (Washington, DC: Department of Health, Education, and Welfare)

Fuller, H. (1973) 'Canadian community pharmacy in 1972.' *Canadian Pharmaceutical Journal* 106, no. 8 (also referenced as Canadian Pharmaceutical Association, 1973)

– (1974) 'Net profit in Canadian pharmacies (1972).' *Canadian Pharmaceutical Journal* 107, no. 2

– (1975) 'Canadian community pharmacy in 1974.' *Canadian Pharmaceutical Journal* 108, no. 10

– (1976) 'Pharmacies in one-pharmacy towns more profitable, statistics show.' *Canadian Pharmaceutical Journal* 109, no. 1

Furubotn, E. (1976) 'The long-run analysis of the labour-managed firm: an alternative interpretation.' *American Economic Review* 66, no. 1

Goldstein, G.S. and M.V. Pauly (1976) 'Group health insurance as a local public good.' In R. Rosett, ed., *The Role of Health Insurance in the Health Services Sector* Universities – National Bureau Conference Series 27 (New York: National Bureau of Economic Research)

Greenlick, M.R. and B.J. Darsky (1964) 'Prescription utilization by the aged'' *Journal of Gerontology* 19, no. 5

– (1968) 'A comparison of general drug utilization in a metropolitan community with utilization under a drug prepayment plan.' *American Journal of Public Health* 58, no. 11

Green Shield (1975, 1976) See Prescription Services Incorporated

Hadley, J. (1974) 'Research on health manpower productivity: a general overview.' In J. Rafferty, ed. *Health Manpower and Productivity* (Lexington, Mass.: D.C. Heath)

Hall, C. (1966) 'Deductibles in health insurance: an evaluation.' *Journal of Risk and Insurance* 23, no. 2

– (1974) 'Impact of cost-sharing on consumer use of health services.' In S. Mushkin, ed., *Consumer Incentives for Health Care* (New York: PRODIST)

Hann, H.J. (1967) 'Prices and productivity in dental care.' *Journal of Public Health Dentistry* 27, no. 3

Harley, H. (1967) See Canada, House of Commons (1967)

Hartwell, M. (1974) 'The economic history of medical care.' In Perlman, ed. (1974)

Havighurst, C. (1974) 'Speculations on the market's future in health care.' In C. Havighurst, ed., *Regulating Health Facilities Construction* (Washington, DC: American Enterprise Institute)

– (Nov. 1976) 'Controlling health care costs: strengthening the private sector's hand.' Adopted from testimony delivered before the Council on Wage and Price Stability, Houston, Texas, 21 Oct. 1976 (mimeo.) (Durham, North Carolina: Duke University Law School)

Holahan, J. (Feb. 1976) *Physician Supply, Peer Review, and Use of Health Services in Medicaid* (Washington, DC: Urban Institute)

Holthausen, D.M. (1976) 'Input choices and uncertain demand.' *American Economic Review* 66, no. 1

House, R. (1970) *Dentistry in Ontario.* A study prepared for the Ontario Committee on the Healing Arts (Toronto: Queen's Printer for Ontario)

Illich, Ivan (1976) *Limits to Medicine* (Toronto: McClelland and Stewart) (Enlarged from *Medical Nemesis: The Expropriation of Health.* London: Calder and Boyars, 1975)

Josie, Gordon H., ed. (Dec. 1973) *World Health Organization International Collaborative Study of Medical Care Utilization: Report on Basic Canadian Data* (Saskatoon, Saskatchewan: University of Saskatchewan Department of Social and Preventive Medicine)

Kawakami, T. (1974) 'The system of medical care in Japan and its problems.' In Perlman, ed., (1974)

Kilpatrick, K. *et al.* (1972) 'Expanded function auxiliaries in general dentistry: a computer simulation.' *Health Services Research* 7, no. 4

Kisko, T. *et al.* (1973a) *Dental Simulation Model User's Manual* (mimeo.) (Gainesville, Fla.: University of Florida Health Systems Research Division)

– (1973b) *A Manpower Analysis of Private Practice Dentistry through Simulation* (mimeo.) (Gainesville, Fla.: University of Florida Health Systems Research Division)

Kushman, J. and R. Scheffler (1975) 'Rationing professional services: some empirical evidence from dentistry' (mimeo.) Dept. of Agricultural Economics, University of California at Davis

Lalonde, M. (1974) *A New Perspective on the Health of Canadians* (Ottawa: Department of National Health and Welfare)

Le Clair, M. (1975) 'The Canadian health care system.' In Andreopoulos (1975)

Leibenstein, H. (1975) 'Aspects of the X-efficiency theory of the firm.' *Bell Journal of Economics* 6, no. 2

– (1976) *Beyond Economic Man* (Cambridge, Mass.: Harvard University Press)

Leland, H. (1972) 'Theory of the firm facing uncertain demand.' *American Economic Review* 62, no. 3

Lewis, D. (May 1974) *Children's Dental Care in 1984 – Dream or Nightmare*? Presentation to Canadian Society of Dentistry of Children, Toronto

– (June 1976) *An Evaluation of the Dental Effects of Water Fluoridation, City of Toronto, 1963-1975.* (Toronto: City of Toronto Department of Public Health)

– and B.I. Brown (March 1973) *Dental Manpower/Population Ratio Estimates for Canada under Four Situations.* Issued as Health Manpower Report no. 1-73 by the Department of National Health and Welfare, Ottawa, Canada

– S.C. Magid and M.E. Jarrett (Aug. 1975) *The Waterloo Time, Cost, and Manpower Study of Incremental Dental Care for Pre-School Children.* Report of Ontario Ministry of Health Demonstration Model Project DM 22 (Waterloo Regional Board of Health)

Liefmann-Keil, E. (1974) 'Consumer protection, incentives, and externalities in the drug market.' In Perlman, ed. (1974)

Lilly, Eli & Co. (1975) *The Lilly Digest 1975* (Indianapolis, Ind.: Eli Lilly & Co. Pharmaceutical Div.)

Lippard, V. and E. Purcell, eds. (1973) *Intermediate-Level Health Practitioners* (New York: Josiah Macy Jr. Foundation)

Manitoba, Committee on Children's Dental Health Care (Dec. 1973) *Report Volume I: Prevention.* Including a separate technical appendix, issued by the Minister of Health and Social Development, Winnipeg

– (April 1972) *Report of the Advisory Committee on Central Drug Purchasing and Distribution* (Winnipeg: Queen's Printer for Manitoba)

Manore, D. (1975) 'Statistics indicate growth due to volume, not prices.' *Canadian Pharmaceutical Journal* 109, no. 9

Marcus, M. *et al*. (1975) 'Dental productivity: a perspective.' *Inquiry*, 12, no. 3

Marshall, A. (1920) *Principles of Economics* 8th ed. (London: MacMillan)

Masson, A. (Dec. 1974) 'The changing legal status of prescription drug price posting: effects and implications' (mimeo.) Working paper prepared within the Federal Trade Commission (Washington, DC: Federal Trade Commission)

Maurice, S.C. and C.E. Ferguson (1972) 'Factor usage by a labour-managed firm in a socialist economy.' *Economica* 39, no. 1

Maurizi, Alex R. (1969) *Economic Essays on the Dental Profession* (Iowa City, Iowa: University of Iowa College of Business Administration)

– (1975) *Public Policy and the Dental Care Market* (Washington, DC: American Enterprise Institute)

McCaffree, K.M. and H.F. Newman (1968) 'Payment of drug costs under a group practice prepayment plan.' *American Journal of Public Health* 58, no. 7

McCain, Roger A. (1975) 'Competition, information, redundancy: X-efficiency and the cybernetics of the firm.' *Kyklos* 28, no. 2

McManus, J. (1975) 'The costs of alternative economic organizations' *Canadian Journal of Economics* 8, no. 3

Meade, J.E. (1972) 'The theory of labour-managed firms and of profit-sharing.' *Economic Journal* 82, no. 325S (March supplement)

– (1974) 'Labour-managed firms in conditions of imperfect competition.' *Economic Journal* 84, no. 336

Mitchell, Bridger M. and R.J. Vogel (1975) 'Health and taxes: an assessment of the medical deduction.' *Southern Economic Journal* XLI no. 4

Moore, K (1973) 'Determination of an optimum delivery system for providing dental care to children: a Saskatchewan perspective.' Unpublished MHSA dissertation (University of Alberta)

Moore, M. (1970) *How Much Price Competition*? (Montreal: McGill-Queens University Press)

– (1976) 'Potential impact of the amendments: an economist's view.' In W. Stanbury, ed., *Papers on the 1975 Amendments to the Combines Investigation Act*. (mimeo.) (Vancouver, BC: Faculty of Commerce and Business Administration, University of British Columbia)

Morehead, Mildred A., Ross Donaldson, and Anne Zanes (1971) 'Dental service at Teamster comprehensive care program, Montefiore Hospital and Medical Centre.' *Journal of the American Dental Association* 83, no. 9

Mossin, J. (1968) 'Aspects of Rational Insurance Purchasing.' *Journal of Political Economy* 76, no. 4, part 1

Mueller, M.S. and R.M. Gibson (1975) 'Age differences in health care spending, fiscal year 1974.' *Social Security Bulletin*, June

New, Peter K.-M. and M.L. New (March 1975) *The Collation and Description of Canadian Studies of the Utilization of Dentist Services*. Dental Health Care Services and Epidemiology Research Unit, University of Toronto

Newhouse, J. (Feb. 1976) 'Health care cost sharing and cost containment' (mimeo). Rand Corporation Paper P-5615 (Santa Monica, Calif.)

– and C. Phelps (April 1974) 'On having your cake and eating it too: an analysis of estimated effects of insurance on demand for medical care.' R-1149-NC (Santa Monica, Calif.: Rand Corporation)

Nikias, M.K. (1968) 'Social class and the use of dental care under prepayment.' *Medical Care* VI, no. 5

Ontario, Government of (1975) *Ontario Statistics 1975* (Toronto: Queen's Printer for Ontario)

Ostry, S. (1976) 'Competition policy and the self-regulating professions.' Address to the Conference on the Professions and Public Policy sponsored by the Law School of the University of Toronto (Toronto: Oct. 16)

Pauly, M. (1968) 'The economics of moral hazard: comment.' *American Economic Review* 58, no. 3, part 1

– (1969) 'A measure of the welfare cost of health insurance.' *Health Services Research* 4, no. 4

– and M. Redisch (1973) 'The not-for-profit hospital as a physicians' co-operative.' *American Economic Review* 63, no. 1

Perlman, M., ed., (1974) *The Economics of Health and Medical Care*. Proceedings of a Conference of the International Economic Association (London: Macmillan)

– (1974) 'Economic history and health care in industrialized nations.' In Perlman, ed. (1974)

Prescription Services Incorporated (Green Shield) (June 1975) *Eighteenth Annual Report 1974*. 285 Giles Blvd E., Windsor, Ontario

– (June 1976) *Nineteenth Annual Report 1975*. 285 Giles Blvd E., Windsor, Ontario

Pugh, C. (1969) 'The Yukon school dental care experiment.' *Canadian Dental Association Journal* 35, no. 7

Quebec, Ministry of Social Affairs (Nov. 1975) *Programme de Santé Dentaire en Milieu Scolaire* (mimeo.) Document de travail, Service de la conception des programmes, Direction de la planification des services de santé, Quebec City

– (May 1976) *La Santé Dentaire au Quebec*. Document pour discussion, Service de la conception des programmes, Direction de la planification des services de santé, Quebec City

– Regie de l'Assurance-Maladie du Québec (1975) *Statistiques Annuelles 1974* (Quebec City: RAMQ)

– Regie de l'Assurance-Maladie du Québec (1976) *Statistiques Annuelles 1975* (Quebec City: RAMQ)

Rabin, D.L. and P.J. Bush (1976) 'Who's using medicines?' *Journal of Community Health* 1, no. 2

Record, Jane C. and M.R. Greenlick (1975) 'New health professionals and the physician role: an hypothesis from Kaiser experience.' *Public Health Reports* 90, no. 3

Redig, Dale E. *et al.* (1974) 'Expanded duty dental auxiliaries in four private offices: the first year's experience.' *Journal of the American Dental Association* 88, no. 5

Reinhardt U (1972) 'A production function for physician services.' *Review of Economics and Statistics* 54, no. 1

Rivard, J.-Y. and A.P. Contandriopoulos (1976) *Evolution du Profil de Pratique des Médicins du Québec depuis l'introduction de l'Assurance-Maladie.* Final report, NHG project (Montreal: Université de Montreal)

Robertson, W. (1976) 'Merck strains to keep the pots aboiling.' *Fortune*, March

Romcke, R.G., and D.W. Lewis (July 1972) *The Prince Edward Island Dental Manpower Study*. Report of NHG project 601-7-9 (Charlottetown, PEI: Department of Health)

Roos, N. *et al.* (1976) 'The impact of the physician surplus on the distribution of physicians across Canada.' *Canadian Public Policy* 2, no. 2

Rosenbaum, J. *et al.* (1975) 'A method for assessing dental manpower need as tested in a low income area of Philadelphia.' *Public Health Reports* 90, no. 3

Rosett, R. (1974) 'Proprietary hospitals in the United States.' In Perlman (1974)

Rothschild, M. (1973) 'Models of market organization with imperfect information: a survey.' *Journal of Political Economy* 81, no. 6

Rucker, T.D. (1974) 'Drug use data, sources, and limitations.' *Journal of the American Medical Association* 230, no. 6 (11 Nov.)

Sandmo, A. (1971) 'On the theory of the competitive firm under price uncertainty.' *American Economic Review* 61, no. 1

Saskatchewan, Advisory Committee on Dental Care for Children (March 1973) *Report*, issued by the Minister of Health, Regina

– Department of Public Health (Nov. 1972) *A Proposal for a Dental Program for Children in Saskatchewan.* (Regina: Research and Planning Branch and Dental Health Division)

– (March 1976) *Saskatchewan Dental Plan Report, September 1, 1974 to August 31, 1975* (Regina)

Saskatchewan Dental Plan Report, September 1, 1975 to August 31, 1976 (Regina)

Segal, H (1974) 'Pharmacy assistants: work profile and assessment for those trained on-the-job ' *Canadian Pharmaceutical Journal.* 107, no. 10, part I, and no. 11, part II

Silverman M. and P.R. Lee (1974) *Pills, Profits, and Politics* (Berkeley, Calif.: University of California Press)

Sisty, N.L. and W.G. Henderson (1974) 'A comparative study of patient evaluations of dental treatment performed by dental and expanded-function dental hygiene students.' *Journal of the American Dental Association* 88, no. 5

Spitzer, W. *et al.* (1974) 'The Burlington randomized trial of the nurse practitioner.' *New England Journal of Medicine* 290, 251

Stanbury, W. and G. Reschenthaler (1976) 'Oliogopoly and conscious parallelism: theory, policy and the Canadian cases' (mimeo.) (Vancouver, BC: Faculty of Commerce and Business Administration, University of British Columbia)

Steel, H. (1962) 'Monopoly and competition in the ethical drugs market.' *Journal of Law and Economics* 5, no. 2

Stigler, G. (1971) 'The theory of economic regulation.' *Bell Journal of Economics and Management Science* 2, no. 1

Stiglitz, J. (1975) 'Incentives, risk, and information: notes towards a theory of hierarchy.' *Bell Journal of Economics* 6, no. 2

Stoddart, G. (1975) 'An episodic approach to the demand for medical care' Unpublished PHD dissertation (Vancouver, BC: University of British Columbia)

Stolley, P. *et al.* (1972) 'The relationship between physician characteristics and prescribing appropriateness.' *Medical Care* 10, no. 1

Tindall, W.A. *et al.* (1974) 'A quantitative examination of repeal of antisubstitution laws in one Canadian province.' *Canadian Pharmaceutical Journal* 107, no. 2

Titmuss, R. (1970) *The Gift Relationship* (London: George Allen and Unwin)

Torrance, G.M. (1972) *The Influence of the Drug Industry in Canada's Health System.* Paper prepared for the Community Health Centre Project (Hastings Project), Feb. 1972, and published by the Canadian Public Health Association, Ottawa

Tuohy, C. and A. Wolfson (1976) 'The political economy of professionalism: a perspective.' Paper prepared for the Consumer Research Council, March 1976 (Toronto: University of Toronto)

Ungar, S. (1972) 'Get away with what you can.' In R. Heilbroner, ed. (1972) *In the Name of Profit* (Garden City, NY: Doubleday)

United States, Department of Health, Education, and Welfare (1971) *Prescription Drug Data Summary* (Washington, DC: Social Security Administration)

– (May 1974) *The Effects of Task Delegation on the Requirements for Selected Health Manpower Categories in 1980, 1985 and 1990.* A study prepared for the Public Health Service, Health Resources Administration, Bureau of Health Manpower Education, Division of Manpower Intelligence, HRA75-57, Bethesda, Md.

- Department of Health, Education, and Welfare, Task Force on Prescription Drugs (1968) *The Drug Users* (Washington: DC: US Government Printing Office)
- (1969a) *Approaches to Drug Insurance Design* (Washington, DC: US Government Printing Office)
- (1969b) *Final Report* (Washington, DC: US Government Printing Office)
- Federal Trade Commission (1974) *Prescription Drug Price Disclosures*. A staff report to the Commission (Washington, DC: Federal Trade Commission)
- (1975) *Disclosure Regulations Concerning Retail Prices for Prescription Drugs*. Reported in *FTC News*, Monday, 2 June 1975 (Washington, DC: Federal Trade Commission)

Upton, C. and W. Silverman (1972) 'The demand for dental services.' *Journal of Human Resources* 7, no 2

Vanek, J. (1970) *The General Theory of Labour-Managed Firms* (Ithaca, NY: Cornell University Press)

Walker, H. (1971) *Market Power and Price Levels in the Ethical Drug Industry* (Bloomington, Ind.: Indiana University Press)

Wertheimer, Albert L. (April 1972) *Economic Analysis of Selected Factors in Drug Delivery* (Washington: National Centre for Health Services Research and Development, Department of Health, Education, and Welfare)

White, Kerr L. (1975) 'International comparisons of medical care.' *Scientific American* 233, no. 2

World Health Organization International Collaborative Study of Medical Care Utilization (WHO-ICS-MCU). See Josie (1973)

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ECONOMICS

Ontario Economic Council Research Studies

13 Extending Canadian Health Insurance: options for pharmacare and denticare

R.G. EVANS and M.F. WILLIAMSON

This study explores the policy options a provincial government might consider in extending health care coverage to the purchase of prescription drugs and dental care. It examines the major public policy objectives involved, such as spreading risk, redistributing wealth, and reducing the barriers to care, and evaluates alternative programs in terms of their costs and efficiency as well as their realization of the basic social objectives of health care. Using varied statistics, some drawn from schemes in other provinces, it estimates what different packages of pharmacare and denticare would have cost in Ontario in 1975. The results indicate that universal coverage may be one of the most costly and least effective options. Based on current modes of service delivery, a universal pharmacare and denticare program would transfer wealth to upper income groups without significantly improving the utilization of health care services.

A study of drug manufacturing and retailing systems in Canada and of the structure of dental services suggests that wasteful methods of service delivery are a key factor in the high costs of pharmacy and dentistry. Changes in the process of delivery could lower per capita costs by 30 to 40 per cent.

Potential annual savings in pharmacy and dentistry together in Ontario run into the hundreds of millions of dollars. The authors show how a combination of competitive pressures and selective public intervention can be used to rationalize the delivery system. They caution, however, that such potential savings will be forever unrealized if a public-insurance type of program is introduced which freezes the existing system in place and forecloses the options of either public provision or private market competition.

R.G. EVANS is a member of the Department of Economics at the University of British Columbia.
M.F. WILLIAMSON is a member of the Department of Public and Community Dental Health and director of Continuing Dental Education at the University of British Columbia.

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